Laurel Hill Creek River Conservation Plan

DCNR Plan RCP-7-18

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Somerset County, Pennsylvania
DCNR Plan RCP-7-18

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Executive Summary

This document is a River Conservation Plan for the Laurel Hill Creek Watershed in Somerset County, Pennsylvania. It has been prepared following Pennsylvania Department of Conservation and Natural Resources (DCNR) guidelines and is a master plan for the conservation and enhancement of the watershed. This plan was developed under the direction of the Southern Alleghenies Conservancy and through the efforts of many stakeholder groups and individuals with input from interested members of the general public. Development of the River Conservation Plan included but was not limited to the following:

- Holding a series of public meetings to seek input from the public about topics of importance to the watershed.
- Development of a Geographic Information System (GIS) for the watershed, to be available to the public on the watershed's website at http://www.laurelhillcreek.org/index2.asp.
- Review of historic surface water flow, water quality, and biological diversity data for Laurel Hill Creek and its tributaries.
- Collection of additional surface water flow, water quality, and biological diversity data for Laurel Hill Creek and its tributaries.
- Review of land use practices and activities within the watershed including potential threats to water quantity, water quality, and biota.
- Review of those areas of the watershed that require restoration or enhancement.
- Preparation of this River Conservation Plan with recommendations for management of the watershed to protect, restore, and enhance conditions within the watershed.

The Laurel Hill Creek Watershed encompasses approximately 119 square miles. The main stem of Laurel Hill Creek flows for approximately 38 miles and has a water surface area of about 330 acres. There are 32 named tributaries to Laurel Hill Creek and numerous additional unnamed tributaries. The tributaries to Laurel Hill Creek flow for a collective 240 miles. Stream length, surface water area, and watershed area for each stream in the Laurel Hill Creek watershed are listed in Table WR-1.

The watershed is largely undeveloped. Seventy-three percent (73%) of the watershed is undeveloped, deciduous forest; twenty-four percent (24%) is in agricultural use; and three percent (3%) has existing residential, commercial, or industrial development.

The natural resources of the Laurel Hill Creek Watershed are generally in good condition, with a positive prognosis for the future. However, there are certain tributaries with poor water quality that are impacting the water quality in Laurel Hill Creek, and low stream flows occur more frequently now than in years prior to 1990.

The impact of surface water and ground water withdrawals from the Laurel Hill Creek Watershed on base flow in Laurel Hill Creek was a key issue of concern to stakeholders and persons having long-term familiarity with Laurel Hill Creek. These stakeholders believe that surface and ground water withdrawals in the upper portions of the Laurel Hill Creek Watershed are causing stream flows to be lower than what they recall historically, and that low stream flows are occurring more frequently particularly during summer and late fall. An analysis of stream flow data for Laurel Hill Creek completed as part of this River Basin Conservation Plan indicates that the stakeholders concerns have merit. The analysis was based on flow data collected by the U.S. Geological Survey at their gauging station near Ursina. This analysis shows that the occurrence of low stream flows in Laurel Hill Creek has been substantially higher during the 1991 to 2003 period than during either the 1954 to 1990 time period (marking the beginning of surface water withdrawals by the Somerset Borough Municipal Authority in 1954) or the 1918 to 1953 time period (prior to water withdrawals).

A complete hydrologic analysis, encompassing both surface and ground water inputs and withdrawals, is necessary to further address this pressing issue of low stream flows during late summer and early fall. Development of this river conservation plan was timely with respect to initiation of statewide water resources planning under Pennsylvania Act 220 of 2002. Act 220 – The Water Resources Planning Act – requires the Pennsylvania Department of Environmental Protection (PADEP) to update the 25-year old State Water Plan and identify Critical Water Planning Areas. Act 220 defines a Critical Water Planning Area as "an area comprising any significant hydrologic unit where existing or future demands exceed or threaten to exceed the safe yield of available water resources". The Critical Water Planning Area Subcommittee developed draft criteria for designation of Critical Water Planning Areas in January 2005. The Laurel Hill Creek Watershed stakeholders strongly recommend that the PADEP and DCNR select the Laurel Hill Creek Watershed as the first watershed in Pennsylvania to be evaluated as a potential Critical Water Use Area and provide funding for the necessary studies.

Another key recommendation pertaining to water withdrawals is that a Water Needs Assessment should be completed, and is critical to the future of the river basin. This assessment considers the ecological needs for water in the stream and adjacent wetlauds, and balances those ecological needs with surface and ground water withdrawals for consumptive uses. The greater occurrence of low stream flows in the 1991 to 2003 time period suggests that this balance may have been disrupted by surface water withdrawals.

A key finding in this River Conservation Plan is that the quantitative surface and ground water needs for sustaining this good to excellent ecological health should be established on key tributaries and on the main stem Laurel Hill Creek. Once this "ecologically sustainable water management" approach is developed for the Laurel Hill Creek Watershed, future water withdrawals and development projects can be judged relative to these ecological water needs. The generally high quality nature of this watershed can thereby be maintained for future generations.

The Steering Committee and stakeholder groups developed conclusions and an extensive listing of recommendations aimed at protecting and in some cases, restoring the exceptional quality of the Laurel Hill Creek Watershed. The conclusions and recommendations generally related to the following:

- Public Education and Outreach
- Further Watershed Evaluations and Studies
- Institutional Controls for Watershed
- Restoration Projects

Some of these conclusions and recommendations are summarized in paragraphs 1 through 11 below:

1. No membership-based group is proactively engaged in pursing available grant funding or partnering with other organizations to complete enhancement or conservation projects in the Laurel Hill Creek Watershed. Public involvement and input are the key to watershed stewardship. Various local, state, and federal agencies and officials are involved in planning activities which affect the future of the watershed. However, public input on a systematic and continuing basis is necessary for robust planning for the Laurel Hill Creek Watershed and for future implementation activities to protect and restore the watershed.

2. Enhanced monitoring, evaluations, and demonstration projects are required to effectively manage the watershed. Existing data for the watershed are limited. The River Conservation Plan process provides a baseline evaluation of the watershed and a master plan for the long-term management of the watershed -- the Plan is a beginning for watershed management, not an end. A key aspect of basin management is regular, ongoing monitoring of the watershed including water quality and the stream's benthic community. Such monitoring allows for understanding the effects of natural climatic cycles on the watershed and the impacts of new and existing activities or development within the watershed.

3. Common, local institutional controls which affect watershed conservation are not robustly in place for the Laurel Hill Creek Watershed. Simple mechanisms such as requiring evidence of compliance with Pennsylvania Department of Environmental Protection (PADEP) regulations before local planning approval or building permit issuance would promote compliance with state regulations and could positively affect the watershed. Regulations administered by the PADEP are generally effective at minimizing impacts to a watershed if the regulations are followed, including planning/design aspects that are subject to authorization by a PADEP permit. These regulations are established by Title 25 of Pennsylvania Code. From a layman's perspective, assuring that the public understands that 1.) "any activity disturbing more than 1-acre of land", 2.) "any activity within 50 feet of a stream with defined bed and bank", and 3.) "any sewage system" require a permit is adequate. Enforcement of PADEP regulations (including the failure to get a required permit and to implement an appropriate design), unfortunately, at times, is limited by resources available to local, state, and county officials.

4. Common state and federal institutional controls which affect watershed conservation are not robustly in place for the Laurel Hill Creek Watershed. Establishing broader institutional controls on land use under Title 25 of the Pennsylvania Code could positively affect the watershed. Broader controls could involve mechanisms such as 1.) the designation of waters to the more protective designation of "Exceptional Value" in lieu of existing "High Quality - Coldwater Fishery" designations, 2.) the designation of areas as "unsuitable for mining", 3.) the development of stormwater management plans under Pennsylvania Act 167, and 4.) the development of sewage plans under Pennsylvania Act 537. Also, broader controls could involve activities to designate Laurel Hill Creek as a "Wild and Scenic River" under Federal guidelines. Such controls might also include the pursuit of funds to conserve farmland through the Farm Preservation Program, Clean and Green Program, or other state and federal programs which promote farmland conservation.

5. The withdrawal of water by the Somerset Borough Municipal Authority from Laurel Hill Creek at its existing water treatment plant near Bakersville impacts the character of Laurel Hill Creek. The plant currently withdraws about 1.5 million gallons per day, or about 1,000 gallons per minute, from Laurel Hill Creek. Water from the plant is used for potable water supply in and around Somerset Borough and is thereby discharged outside the Laurel Hill Creek Watershed. The Water Allocation Permit for the plant, which expired in October 2003, indicates a conservation release to Laurel Hill Creek of 1.37 million gallons per day, or about 950 gallons per minute. If the withdrawal by Somerset Borough did not occur, then more water would remain in Laurel Hill Creek with benefits to downstream habitats and uses. The Somerset Borough withdrawal was permitted in the 1950's before the advent of modern-era understanding of watersheds and associated watershed protection regulations.

6. Existing use of areas in the watershed for timbering, agriculture, and roads degrades the character of the watershed. Stormwater runoff related to these uses degrades water quality in Laurel Hill Creek and its tributaries, including pollution from soils/sediments, chemicals, etc. Best Management Practices (BMPs) for these uses are well documented and often easily implemented. The Somerset County Conservation District is a valuable resource for technical support, and at times, a facilitator for financial support related to implementation of these BMPs. Further public awareness of the potential effects of and practical approaches to minimizing impacts from these uses is appropriate.

7. Some existing public access points are degrading the character of Laurel Hill Creek. In many cases, public access points are via local roads or trails with no environmental controls in place. These access points are often roadside pull-offs. In some cases, all terrain vehicle (ATV) trails cross streams. These access points and crossings create negative impacts such as soil erosion, litter, etc. to the stream. Improvements to these areas that implement environmental controls are appropriate and would serve as good examples of controls for stewardship for all areas in the watershed.

8. Some major developed areas have the potential for negative impacts to the watershed. While the watershed is largely undeveloped, some existing developed areas are notable. Major developed areas in the watershed include the Pennsylvania Turnpike as it crosses the watershed, year-round resorts including Hidden Valley and Seven Springs Resorts, the New Enterprise stone quarry on Laurel Ridge, and campgrounds. Also, higher-density residential areas in and around Bakersville, Whipkey Dam, and Triple Creek Acres are notable in that they are currently served by on-lot sewage systems. Most of the Borough of Ursina has no sewage system and a pipe on River Road appears to discharge sewage directly to Laurel Hill Creek. The quality of water in the watershed would benefit from the provision of public sewage systems for these areas. Future monitoring and evaluations should consider the present and future impacts of these major developed areas as appropriate.

9. Investigate water quality impacts from past mining activities including the mine waste piles in the areas of May Run and Smith Hollow. One mine waste pile, located on state game lands, is approximately 10 to 15 acres and could affect water quality in May Run.

10. A white aluminum precipitate has been observed in streambeds at various locations in the watershed. The sources of this precipitate should be investigated and remediated.

11. A study should be performed to evaluate the impact of acid rain on the Laurel Hill Creek Watershed.

1.0 Introduction

The Laurel Hill Creek Watershed covers approximately 124 square miles principally in Somerset County, Pennsylvania. A map of the watershed is presented in Figure 1. The northern limit of the watershed is near the Pennsylvania Turnpike, the western limit is Laurel Ridge adjacent to Hidden Valley Resort and Seven Springs Resort, the eastern limit is the upland plateau which parallels Laurel Ridge about 8 to 10 miles east of the Ridge, and the southern limit is at the mouth of Laurel Hill Creek in Confluence.

This River Conservation Plan has been developed following Pennsylvania Department of Conservation and Natural Resources (DCNR) guidelines. A River Conservation Plan is a master plan for the conservation and enhancement of a watershed. Upon DCNR approval of a River Conservation Plan, the river for which the Plan has been prepared is listed on the DCNR Rivers Registry. Regulatory officials are to consider the recommendations and conclusions of a registry-listed River Conservation Plan in the context of local and regional water resources planning activities. Projects identified by a registry-listed River Conservation Plan generally receive funding priority over non-registry-listed projects under various state and federal grant programs. In summary, a River Conservation Plan is a master plan and guide for:

- *state and federal regulatory officials for water resources and land use planning,*
- *local regulatory and municipal officials for water resources and land use planning, and*
- *citizens and citizen groups that are interested in stewardship of the watershed.*

The River Conservation Plan for the Laurel Hill Creek Watershed was developed with funding provided by the DCNR. Grant funding for development of the plan was secured and administered by Southern Alleghenies Conservancy.

Public input is the cornerstone of a River Conservation Plan. An initial series of public meetings was conducted for the Laurel Hill Creek Watershed River Conservation Plan with the first series of public meetings being held in April 2003. All meetings were open to the public. Anyone who lives, works or recreates in the watershed was encouraged to attend in order to provide the locally driven information that is essential to the success of the plan. Completion of the plan will place the watershed on the state's River Registry and open up funding opportunities for implementation of projects identified in the plan.

The creation of a River Conservation Plan will identify the natural and cultural resources as well as the recreational and economic opportunities and needs that exist in the Laurel Hill Creek Watershed in Somerset County. The

Pennsylvania Department of Conservation and Natural Resources (PA DCNR) funded plan is overseen by a steering committee comprised of local citizens and chaired by Jim Moses of Somerset.

The second series of public meetings for the development of the Laurel Hill Creek Watershed River Conservation Plan was conducted in October 2003. A "Draft Executive Summary" was provided to all attendees at the meetings that summarized the findings and recommendations gathered thus far in the information gathering phase of the project. A complete draft River Conservation Plan will be posted at public libraries, the Confluence Community Center Reading Room, the Somerset Conservation District, the Somerset County Planning Commission for public review.

The public will be able to provide comments to the draft plan at the meetings and there will also be a formal 30-day comment period after the conclusion of the public meeting rounds for additional comment and input into the plan. The plan is being coordinated by a volunteer steering committee comprised of local citizens. Steering committee members will be on hand at the meetings as well.

A final River Conservation Plan will be created in early 2005 and a third series of meetings will be conducted to introduce the plan. Len Lichvar, Executive Director of the Southern Alleghenies Conservancy says, "The public driven River Conservation Plan will gather and assimilate valuable information and determine economic and recreational opportunities in the watershed and recommend how future initiatives would be implemented and who should pursue those objectives." The Pennsylvania Department of Conservation and Natural Resources funded the plan and the plan is being facilitated by the Southern Alleghenies Conservancy.

The following questions were asked at the public meetings. Responses given by meeting participants are listed following each question.

Question #1: What do you like about the watershed?

- Wetlands and wildlife
- Beauty mountains and countryside
- Recreation opportunities (parks, etc.)
- Water supply for use (reliable source) (e.g. agriculture and environment)
- Rural nature of watershed
- Water quality and quantity (groundwater)
- Recreational opportunities
- Scenic and water quality (surface water)
- Impact on downstream water quality (positive impact)
- Diversity of recreation
- Clean surface water
- Historical and cultural importance

- Diversity of wildlife (flora and fauna)
- State Park system
- Quality of life
- Impressive view
- Minimal mining and related impacts
- Amount of public land
- Recreation (hunting, fishing, trapping)
- Good supply of good water
- Vibrant wildlife
- Unaffected by strip mining
- Renewable timber resonrce
- Recreational opportunities at public land and state parks
- Potential for more recreation and wildlife
- Covered bridges (Historic and Cultural Resources)
- Resources in good condition
- Historical and cultural resources (CCC Camps)
- Fishing and boating
- Water availability for use
- Relatively undeveloped
- Covered Bridges
- Recreational access
- Good water quality
- Swimming
- Biodiversity
- Water quality (clean water) and nearly year-round good flow
- Rural nature of watershed
- A lot of public access
- Abundant aquatic life and well defined fauna
- Good early seasonal water flows
- Significant portion is forested
- Citizen involvement as far as recreation
- Historical covered bridges and cultural resources
- Headwaters are clean
- No mining (AMD problems)
- High quality water for flora and fauna proliferation
- Recreational activities
- Diversity of natural resources
- High amount of native forests (rel. intact ecosystems)
- State Parks
- Source of high quality water (for community water supply)
- Close to home, don't have to drive to see natural beauty
- Co-existing relationship with agriculture
- Native trout species are still present, as well as may flies
- Fire protection supplemental source

Question #2: What can be improved in the watershed?

- Agriculture best management practices to improve water quality (manure, sludge, herbicides, pesticides)
- Litter in the watershed
- Rails to trails – hiking opportunities
- Control of recreation use (number of people)
- Regulatory control of water withdrawals
- Develop the plan to maintain the current balance in the watershed
- Additional acquisition of public land for preservation
- Preservation of historic sites (e.g. covered bridges, mills) (identify areas)
- Protection of springs
- Groundwater recharge
- Water quality assessment and data
- Clarification of regulations of state agencies (who to contact and get answers from) lack of action lack of follow-up; especially PADEP
- Increasing public ownership
- Nutrient management (stream side buffers) plans and implementation of plans
- Land use planning and management
- Develop riparian buffers along entire reach through incentives
- Pnblic access for recreation and public use
- Increased respect for private property owner
- Manure management
- Management of on-lot septic systems
- Forest owner association, management of timber lands (sustainable forestry)
- More stakeholder involvement and more citizen involvement
- Better protection and management of groundwater
- PennDOT de-icing material
- Lack of public access – posting of land
- Precipitation vs. water flow data
- Increase in temperature at reservoir spillways
- Better enforcement and education of recreation (signage and litter)
- Stewardship by landowners
- Small residential
- Larger landowner (commerce, agriculture, timbering)
- Resorts
- Coldwater fisheries in dry years
- Impacts of water withdrawals
- Impacts of stream geometry
- Riparian vegetation
- Control of turnpike runoff (ind. salt)
- Control of nutrient runoff (Sediment and non-point sources)
- Control of non-point source pollution – septic systems
- Buffering capacity of natural system
- Return of withdrawn water
- Stream gauging systems and amount of baseline data
- Evaluation of public water wells
- Conservation of withdrawn water
- Fewer water withdrawals (larger withdrawals) (not private withdrawals)
- More consistent flows
- Fewer groundwater withdrawals
- Water temperature

- Algae growth in stream
- Silt control without logging
- Aluminum deposition in stream (Rt. 653/Humbert)
- Stream cleanups (litter) (household waste)
- ATV's and dirt bikes (noise, dirt) (control of)
- Upgrade Laurel Hill to Exceptional Valve better protection
- Water withdrawals (don't exceed or decrease)
- Metal contamination (Humbert on downstream)
- Narrowing lower stream channels (lower stream channels to wide)
- Reduce current water withdrawals
- Use stream as a teaching tool in local schools
- Convert old railroad trail into rails for trails
- Stream bank stabilization to prevent sedimentation
- Development of local group to work toward improvements in stream
- Create demonstration or pilot projects for stream improvements (boy scouts, or other local groups) (forestry best management practices)
- Better enforcement of existing regulations
- Set back for timbering along stream
- Forest management practices
- Education of local municipalities
- Better management for dirt roads (run-off)
- Seven Springs expansion impacting Fall Run and Allen Creek (improve treatment systems) and (better planning for expansion)
- Improve monitoring practices, esp. during high flows (monitoring of wastewater)
- Improved resort master planning and state follow-up
- Organization and communication between members of the public to discuss issues impacting watershed.
- State regulations and management (i.e. logging)
- Identification of historical sites (McCoy pottery)
- Access to stream banks and improve facilities
- Survey of wildlife (broad identification of biodiversity)
- Run-off from PA turnpike (i.e. chlorides)
- Agricultural practices (esp. run-off)
- Kooser Run bacteria issues (Hidden Valley possible source of bacteria)
  Seven Springs water usage and withdrawal
- Siltation on upper reaches, farming practices
- Water withdrawal by municipalities
- Sewage treatment plants (Hidden Valley, Scottyland, etc.) on Laurel Hill Creek; esp. during high flow events.
- Blue Hole and Laurel Hill Confluence wash out from dredging in headlands of Blue Hole increases flooding during high water.
- On-Lot septic system quality
- High temperature of water
- Acid rainfall

Question #3: Can you identify future issues that might affect the watershed?

- Habitat loss (wildflowers)
- Water withdrawals
- Potential mining (coal rights, gas rights)
- Quarry operations
- Alternative water sources and reallocation of water
- Unregulated development
- Political or profit motivated decision making
- Loss of springs (groundwater)
- Expansion of New Enterprise stone quarry
- Increased development pressure
- Increased water extraction
- Increased herd sizes
- Additional public input
- Overuse by recreational people
- Monitor campgrounds (expansion)
- Somerset Borough water withdrawal (wells & surface)
- Acid rain impacts
- Declining water quality from increased usage
- Reduction in forest cover
- Reduced federal and state regulations
- Natural resource mining (especially coal)
- Quemahoning water project as water source
- Terms of Somerset Borough water allocation permit
- Water withdrawals by resorts
- Climatic issues (amount of rain and snow pack, acid rain, global warming)
- Exotic species proliferation – Flora and Fauna (Kudzu)
- Amount of development (Proliferation of second homes)
- Timber/agricultural practices
- Government regulations
- Mining practices (coal mining)
- Stone quarries (limestone)
- Development (unregulated, unplanned)
- Consideration for designation as unsuitable for mining
- Proliferation of water supply wells in headwaters
- Excessive water withdrawal
- Lose of focus on positives of watershed
- Resort development
- Water should remain in watershed (interbasin transfer)
- Water use by prisons
- Increased groundwater withdrawals
- Increased surface water withdrawals
- Seven springs water withdrawal increases
- Sewage impacts on water quality (Ursina, Scottyland, Triple Creek)
- Resort expansion
- Poorly planned development (infrastructures can't handle expansion)
- Sewage
- Population expansion

Question #4: Who do you think should work to improve and protect the watershed?

- The community (coalitions, alliances)
- The recreational users (the actual users)
- Local government
- Sportsmen's associations
- Watershed associations
- State and Federal governments
- Conservation organizations
- Businesses that have impacts
- PADEP and prepare more reporting to local entity
- Fish and boat commission
- Local management with fund assistance
- Watershed organizations
- Build a consensus of organizations
- Elected officials
- USEPA
- School districts – get students involved
- "Adopt-a-Stream" program (develop)
- Specialized citizen committees
- Landowners
- Somerset Borough
- People that live in the watershed
- Watershed group
- Public landowners (Parks, State Forests)
- Municipalities "IN" the watershed
- Individuals (Litter pick-up, policing)
- Seven Springs
- Somerset Township
- Laurel Valley Land Assoc.
- Local Government
- State Government (Fish Commission, DEP, DCNR)
- Federal Government
- Trout unlimited
- Local citizens
- State agencies (DEP, DCNR, Game Commission)
- Fish and boat commission
- Laurel Hill Creek Watershed Assoc.
- Local group partnering without DEP
- List of sources of who to contact or get more information
- Everyone needs to be involved
- Large landowners
- Local municipalities
- County involvement (county level government)
- Seasonal residents and visitors
- Local watershed association
- Western PA Conservancy

Question #5: Watershed Restoration Needs:

- Suds in Laurel Hill Creek
- Agriculture community
- Dirt and gravel roads
- Agriculture BMPs and education
- Resorts take water – does it ultimately be put back more development impacts
- Monitoring continue
- TMDL
- Flow of stream – needs to be monitored
- Oral history (Shaffer Run)
- Vote for the people who will address your needs voter education.
- Public Landowner Game Commission E&S, silt fence (for timbering practices)
- Roads allowing dirt into stream (agriculture areas, PennDOT maintenance channels road runoff to creek
- Quarry
- Best Management Practices (BMP) for timbering (Private) demonstration project see: Hickory Flats Road and Grindel Ridge Road
- Education
- County-wide ordinance vs. local stormwater management/E&S/Stream encroachment/conservation plan for agriculture areas
- Beef up forestry section – private landowners forest stewardship help on "Implementation" sustainable forestry practices.
- Good conservation practices on agriculture land
- Watershed – wide nutrient management plan
- "Narrow" stream channels
- Re-establish riparian buffer areas
- Sewage treatment plants (Hidden Valley/Scottyland) assessed at capacity? improvements
- ESWM (or IFIM) in plan
- Drought months and effects of water withdrawals (e.g. Somerset Boro)
- More emphasis on effects of surface and groundwater withdrawals (and prioritize)
- Coliform bacteria sampling during runoff events
- Sewage smell during high flows (overflows?) (discharge?)
- Look at seasonal aspects, flow variations, impacts on habitats
- Septics to sewage treatment

Question #6: Watershed Resources

- Ghost towns – need a more historical search of past industry/towns
- Forbes State Forest Management Plan – Agency doesn't know about RCP
- Long-term monitoring plan – Wells of Shaffer Run and sub-watersheds – Clear Run Turnpike
- Interbasin transfer of water
- Forbes State Forest Management Plan
- Groundwater withdrawal (Quemahoning Reservoir)
- Groundwater recharge
- Can Somerset Borough take the "Hot" water
- Invasive species (Japanese knotweed)
- Wetlands – Cranberries (bogs) wetland protection
- Engage farmers (farmer's association)

2.0 People Resources

People are a key resource for the watershed and for the development of this River Conservation Plan. A Steering Committee was formed by the Southern Allegheny Conservancy to guide the development of the Plan. The Steering Committee members are scientists, sportsmen, planners, engineers, and others that have devoted their efforts gratis in support of development of the plan. Steering Committee members and affiliation are:

Larry Adams (Writer/Photographer/Conservationist)
Randy Buchanan (Mountain Laurel Chapter Trout Unlimited)
Rita Coleman (Pennsylvania Department of Environmental Protection, Watershed Manager)
Scott Cope (Pennsylvania Department of Conservation and Natural Resources)
Bob Ging (Yough River Watch)
Art Gusbar (Consultant)
Bob Hufman (Laurel Hill State Park)
Carl Jones (Somerset County Conservation District)
Roger Latuch (Casselman River Watershed Association & Somerset County Conservancy)
Len Lichvar (Southern Alleghenies Conservancy)
Lester McNutt (Somerset County Sportsman's League)
Jim Moses (Laurel Hill Watershed Association & Somerset County Conservancy)
John Peters (Somerset County Planning Commission)
Deb Simko (Western Pennsylvania Coalition for Abandoned Mine Reclamation)
Sue Moon (Somerset County Conservation District)
Jon Wahl (Consultant)
Warren Werntz (Kooser State Park)
Dave Woy (Somerset County Fly Fishers)

The Steering Committee members have a great breadth of experience with the Laurel Hill Creek Watershed. The members are an equally excellent resource for future implementation of the plan.

The Somerset County Conservation District and the Western Pennsylvania Coalition for Abandoned Mine Reclamation provided gratis effort in field data collection for the Plan. These organizations are actively engaged in watershed stewardship activities and are a resource for future implementation of the Plan.

The breadth of experience and interests of the Steering Committee reflects the general populace that utilizes the Laurel Hill Creek Watershed. Major uses of the watershed include fishing, hunting, camping, canoeing and boating, hiking, nature observation, winter skiing, and other recreational pursuits.

It is the desire of the watershed stakeholders, established through the series of public meetings held during development of this Plan, that the watershed be protected to the extent that these recreational pursuits are

maintained and enhanced in the future. The watershed stakeholders recognize the value of the natural resources of the watershed, and they look to this Plan as a blueprint for protection and restoration of the river basin's resources.

3.0 Laurel Hill Creek Watershed Geographic Information System

Data were compiled on the physical features of the Laurel Hill Creek Watershed and integrated into an Arcview Geographical Information System (GIS) for the watershed. The GIS is available for public use through the Laurel Hill Creek website at http://www.laurelhillcreek.org/index2.asp. Figures 1 through 11 in this River Conservation Plan summarize GIS data for the watershed. Primary data sources for the GIS are as follows:

3.1 Base Map

The base map, as shown on Figure 1 for the GIS was generated from United States Geologic Survey (USGS) 1:24,000 scale topographic quadrangles and from files downloaded from Pennsylvania Spatial Database Access (PASDA). The outline of the Laurel Hill Creek Watershed was determined by digitizing ridgeline locations surrounding the major tributaries of the watershed. The locations of lakes, municipal boundaries, roads, and streams were downloaded from PASDA and incorporated into the digitized boundaries of the watershed. Subwatersheds or subareas shown in Figure 1 were delineated utilizing digital elevation models (DEMs) downloaded from the USGS. Spatial Analyst for ArcView Version 3.2 was used to identify the subareas, drainage courses, land slopes and lengths, and drainage element lengths and slopes from the DEMs. To check the output of the GIS, the subareas were also delineated utilizing 1:24,000 USGS topographic quadrangles.

3.2 Land Use/Zoning

Existing land use data is shown on Figure 2 and was determined from a review of Somerset County tax maps, USGS topographical quadrangles, and information obtained from the Somerset County Assessment Office. In addition, aerial photographs, soil survey maps, field verification, and personal knowledge were used in this determination.

The watershed is largely undeveloped. Seventy-three percent (73%) of the watershed is undeveloped, deciduous forest; twenty four percent (24%) is in agricultural use; and three percent (3%) has existing residential, commercial,

or industrial development. Agriculture and timbering in the watershed provide a renewable resource to the local economy.

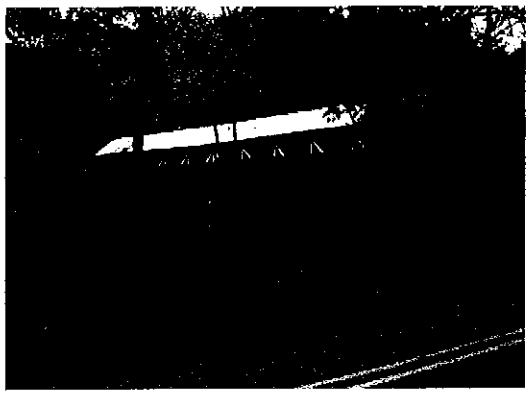
The watershed has extensive lands owned by the Commonwealth of Pennsylvania. Twenty-nine percent (29%) of the watershed is held by the Commonwealth including over ten (10) square miles in State Parks lands including Laurel Hill State Park, Kooser State Park, and Laurel Ridge State Park; over sixteen (16) square miles in Forbes State Forest; and almost nine (9) square miles in State Gamelands No. 111.

The watershed is managed by the Pennsylvania Department of Environmental Protection (PADEP) as Special Protection Waters. All areas in the watershed are designated as either High Quality - Cold Water Fisheries or Exceptional Value waters. Land development activities or water encroachment activities are required to have site-specific planning and design in conjunction with individual permits issued by the PADEP.

The watershed is actively managed by the Pennsylvania Fish and Boat Commission (PFBC) as a trout fishery. Fishery management includes stocked trout areas as well as wild trout stream areas.

The watershed is prime habitat for a variety of flora and fauna. Native species thrive throughout the watershed. In addition, the watershed provides suitable habitat for and is potentially home to various protected floral species including: *Cimicifuga americana* (American bugbane), *Luzula bulbosa* (southern wood-rush), *Najas gracillima* (bushy naiad), *Platanthera peramoena* (purple-fringeless orchid), *Pyrulaira pubera* (buffalo-nut), *Trautvetteria caroliniensis* (Carolina tasselrue), and *Viola appalachiensis* (Appalachian blue violet). The watershed provides suitable habitat for and is potentially home to protected faunal species including: *Myotis sodalis* (Indiana bat), *Crotalus horridus* (timber rattlesnake), *Myotis septentrionalis* (northern Myotis), *Myotis leibii* (small-footed Myotis), *Neotoma magister* (eastern woodrat), *Pandion haliaetus* (osprey), *Haliaeetus leucocephalus* (bald eagle), *Sorex palustris punctulaus* (West Virginia water shrew), *Sorex palustris albibarbis* (northern water shrew), *Bartrimia longicuada* (upper sandpiper), and *Lutra Canadensis* (northern river otter).

The watershed has a rich cultural heritage. Covered bridges are well known landmarks in the watershed including Barronvale, Lower Humbert, and Kings covered bridges. The watershed has a history of mills, logging, and Civilian Conservation Corps Camps. The watershed includes many structures of unique construction. The lower reaches of the watershed also provided campsites for early settlers as well as Native Americans. Documentation and preservation of cultural resources in the watershed are unfortunately limited.



3.3 Geology

The surface geology information presented, as shown on Figure 3, was obtained from PASDA and incorporated into the overall GIS mapping.

3.4 Soils

Soil mapping, as shown on Figure 4, was obtained utilizing the Soil Survey Geographic (SSURGO) database for Somerset County, Pennsylvania. This database is a digital soil survey prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). Prime Farmlands and Hydrologic Soil Groups and Soil Erodibility are shown on Figures 5 and 6. Farmland designations are shown on Figure 7.

3.5 Wetlands

Wetland quadrangle maps, as shown on Figure 8, were obtained from the United States Fish and Wildlife Services National Wetlands Inventory and incorporated into the overall GIS mapping.

3.6 Recreation

Figure 9 identifies recreational areas within the watershed. This GIS layer was developed from DCNR maps of state parks and forests. The watershed has existing public and private infrastructure to access and enjoy the watershed. Public facilities at Laurel Hill State Park and Kooser State Park are extensive and provide excellent access for recreational use. Areas in state game lands and state forests provide excellent access for hunting and other recreational uses. Existing state and local roads provide adequate access to Laurel Hill Creek throughout the watershed.

Private recreation facilities include campgrounds such as Pioneer Park, Lost Mountain Campground, and Scottyland. Seven Springs and Hidden Valley Resorts are full-service resorts in the watershed. There are also non-profit-owned camps including YMCA Camp Soles and the Eberly Scout Reservation.

Recreational use of areas in the watershed provides strong sources of business and personal income. Recreational use attracts visitors to the watershed from major metropolitan areas including Pittsburgh, Baltimore, and Washington, D.C.

3.7 Transportation

Transportation routes are identified in Figure 10 and were based on Pennsylvania Department of Transportation maps.

3.8 Water Quality Monitoring Locations

The GIS layer depicted by Figure 11 indicates the locations of United States Department of the Interior (USDOI) surface water monitoring points within the watershed. These points were located based on USDOI publication entitled Water Resource Data, Pennsylvania Water Year 1984, Volume 3.

4.0 Geological Resources Summary

The Laurel Hill Creek Watershed encompasses approximately 124 square miles situated mostly in western Somerset County and a relatively small upland area within eastern Fayette County. It is bounded to the west by Laurel Hill and to the east by a low drainage divide with the Casselman River. Topographic elevations within the watershed range from a low of approximately 1,330 feet at the confluence of Laurel Hill Creek with the Casselman River to approximately 2,980 feet on Laurel Hill. This area lies within the Allegheny Mountain Section of the Appalachian Plateau's Physiographic Province. The Laurel Hill Creek Watershed is underlain by Mississippian to Pennsylvanian age sedimentary rock strata.

4.1 Stratigraphy

Mississippian Age Rock Strata

The oldest rock strata exposed within the watershed is the Burgoon Sandstone, which comprises the uppermost portion of the Mississippian age Pocono Formation. The Burgoon Sandstone is exposed in the valleys incised into the eastern flank of Laurel Hill and is a gray, fine to medium-grained quartzitic sandstone with some beds of siltstone. It is cross-bedded and contains beds of conglomerate within 16 feet of its base. The Burgoon Sandstone is approximately 300 feet thick (McElroy, 2000).

The Loyalhanna Formation overlies the Burgoon Sandstone. The Loyalhanna Formation is a light gray to red, sandy limestone, approximately 50 feet thick and exhibits very prominent cross-bedding that is readily observed on weathered outcrop surfaces. The sand grains within the Loyalhanna Limestone are primarily quartz. The Loyalhanna Limestone is extensively quarried within Somerset County and used primarily for crushed aggregate.

The Mauch Chunk Formation overlies the Loyalhanna Limestone. The Mauch Chunk Formation is approximately 250 feet thick and consists of an interbedded sequence of shale and sandstone with a few beds of siltstone and limestone. The Mauch Chunk Formation is distinguishable by its red and green beds but also contains gray beds. It can be further divided into an upper Mauch Chunk approximately 140 feet thick and a lower Mauch Chunk approximately 90 feet thick. The upper and lower portions are separated by the 3 to 10 foot thick Wymps Gap Limestone.

Pennsylvanian Age Rock Strata

The contact between the top of the Mauch Chunk formation and the base of the overlying Pottsville Group marks the boundary between the older Mississippian age rock strata and the younger Pennsylvanian age rock strata. Within the Laurel Hill Creek Watershed, Pennsylvanian age rock strata are found on the eastern flank of Laurel Hill above the Main Stem of Laurel Hill Creek.

The Pottsville Group consists primarily of medium-grained to conglomeratic sandstones with some interbedded shale and minor coal and clay. The thickness of this rock unit is highly variable ranging from as thin as 50 feet to as much as 275 feet thick. Individual sandstone beds within the Pottsville Group range in thickness from 10 to 70 feet and include the Sharon Sandstone, Lower Connoquenessing Sandstone, Upper Connoquenessing Sandstone, and the Homewood Sandstone.

The Pottsville Group is overlain by the Allegheny Group that consists of alternating layers of shale, claystone, siltstone, sandstone, and coal with some clay and limestone beds. The Allegheny Group ranges in thickness from 280 to 320 feet and was further divided into the Clarion Formation, Kittanning Formation, and the Freeport Formation (Flint, 1965). Several of the coal beds within the Allegheny Group have been mined including the Brookville Coal, Lower Kittanning Coal, Upper Kittanning Coal, Lower Freeport Coal, and Upper Freeport Coal.

The Allegheny Group is overlain by rock strata of the Glenshaw Formation that consist of repeated sequences of sandstone, siltstone claystone, limestone, and coal. The Glenshaw Formation crops out in the immediate vicinity of the Main Stem of Laurel Hill Creek and in areas east of Laurel Hill Creek. There are four major marine limestone beds within the Glenshaw Formation. They are the Brush Creek Limestone, Pine Creek Limestone, Woods Run Limestone, and the Ames Limestone. The Ames Limestone, which marks the top of the Glenshaw Formation, is fossiliferous and persistent throughout the area and is generally used as a marker bed. Many of the claystone beds are redbeds including the Mahoning redbed, Myersdale redbed, and the Pittsburgh redbed.

The Casselman Formation overlies the Glenshaw Formation. Stratigraphically, the Casselman Formation is defined as the rock interval lying between the top of the Ames Limestone and the base of the Pittsburgh Coal.

4.2 Geologic Structure

Laurel Hill, which forms the western divide of the Laurel Hill Creek Watershed, is formed by an anticline (upfolded) in the underlying rock strata. The axial trace of the Laurel Hill anticline closely follows the ridgeline of Laurel Hill. The Laurel Hill Creek Watershed is situated on the southeastern limb of the Laurel Hill anticline. Rock strata beneath the Laurel Hill Creek Watershed dip toward the east-southeast at an average rate of four degrees toward two synclinal (downfolded) areas, the Youghiogheny Syncline, and the New Lexington Syncline. This dip angle is steeper than the topographic slope, consequently, progressively younger rock strata are exposed at the land surface from west to east across the watershed. No major bedrock fault zones are evident at the land surface within the Laurel Hill Creek Watershed. However, geological studies and drilling of deep gas wells in Somerset County indicate that extensive faults are likely present at depth.

4.3 Mineral Resources

Economically extractable mineral resources within the Laurel Hill Creek Watershed include coal, limestone, sandstone, and clay. Coal is the most utilized mineral resource of the area and has been mined primarily from the strata of the Allegheny Group. The Allegheny Group includes 13 coal seams most of which have been mined on a small scale for "house coal". Only five of the coal seams are of mineable thickness for large-scale mining operations. These seams are the Brookville Coal, Lower Kittanning Coal, Upper Kittanning Coal, Lower Freeport Coal, and Upper Freeport Coal.

Small quantities of natural gas have been produced from gas wells drilled into rock strata of the Onondaga Group and the Oriskany Sandstone along the Laurel Hill anticline at the western border of the Laurel Hill Creek Watershed. However, no major gas fields are known within the Laurel Hill Creek Watershed.

Limestone is a valuable mineral resource within the Laurel Hill Creek Watershed. The Mississippian age Loyalhanna Limestone is the primary source of rock quarried as construction aggregate. Its high silica content makes it ideal for use as aggregate in concrete and as stone for roadway construction. However, due to its low calcium carbonate content, the Loyalhanna Limestone is not suitable for agricultural lime or cement making. Other valuable limestone beds include the Deer Valley Limestone which lies directly above the Loyalhanna Limestone and the Wymps Gap Limestone of the Mauch Chunk Formation. These limestones have a relatively high calcium carbonate content and are typically used for agricultural lime.

Underclays beneath the coal seams of the Allegheny Group are a valuable source of refractory grade clay. In particular, underclay from the Clarion Coal, Lower Kittanning Coal, and Middle Kittanning Coal are known for their good quality as refractory material. Clay beds from the Glenshaw Formation have been utilized as a source of common brick and bonding clay.

Many of the sandstone units that underlie the Laurel Hill Creek Watershed have been utilized as a source of building stone and dimension stone. These include the Burgoon Sandstone of the Pocono Formation; the Connoquenessing and Homewood sandstones of the Pottsville Group; and the Kittanning and Freeport sandstones of the Allegheny Group.

5.0 Water Resources

5.1 Physical Characteristics of Laurel Hill Creek Main Stem and Tributaries

The Main Stem of Laurel Hill Creek flows for approximately 38 miles and has a water surface area of about 330 acres. The named tributaries to Laurel Hill Creek flow for a collective 145 miles. The entire drainage area for Laurel Hill Creek Watershed, including all of its tributaries, encompasses an approximately 76,000 acres (119 square miles). Stream length, surface water area, and watershed area for each named stream in the Laurel Hill Creek Watershed are listed in Table WR-1.

Table WR-1. Stream lengths and subwatershed areas.

Stream	Watershed Area (acres)	Surface Water Area (acres)	Stream Length (miles)
Allen Creek	2,911.6	8.6	5.0
Ansell Run	322.6	N.M.	1.0
Blue Hole Creek	2,098.5	1.6	4.8
Buck Run	701.6	N.M.	1.2
Clear Run	2,839.3	4.0	4.9
Coke Oven Hollow	1,058.7	N.M.	3.0
Cole Run	828.6	N.M.	2.4
Crab Run	2,654.4	N.M.	2.9
Crab Run II (East of Allen Run)	382.8	0.8	1.8
Cranberry Glade Run	3,190.1	95.4	12.2
Crise Run	624.0	N.M.	2.0
Fall Creek	3,505.2	1.6	5.2
Garys Run	781.1	N.M.	2.7
Green King Run	1,095.5	N.M.	2.1
Gross Run	746.3	N.M.	2.4
Harbaugh Run	1,631.6	7.7	2.7
Jones Mill Run	3,120.5	3.7	5.9
Keller Run	625.8	N.M.	2.0
Kooser Run	2,940.2	17.1	5.0
Laurel Hill Creek (Main Stem)	24,013.0	330.0	37.6
Lost Creek	2,686.5	30.3	4.6
May Run	721.6	0.7	1.6
Moore Run	430.0	N.M.	1.3
Mose King Run	1,514.8	1.7	3.3
Paddytown Hollow	1,881.2	0.8	4.1
Sandy Run	4,858.4	14.7	7.1
Shafer Run	2,678.2	N.M.	4.9
Shanks Run	577.6	5.3	1.5
Showman Run	412.5	N.M.	1.2
Smith Hollow	2,514.1	N.M.	4.0
Spruce Run	1,390.2	4.0	3.2
Whipkey Run	536.2	N.M.	1.6
Total	76,272.5		145.2

There are 32 named tributaries to Laurel Hill Creek, and numerous additional unnamed tributaries. In terms of flow, major tributaries to Laurel Hill Creek are:

- Blue Hole Run – 63.6 cfs (13.5% of the Main Stem flow measured at Ursina)
- Shaffer Run – 36.3 cfs (5.4%)
- Jones Mill Run – 33.0 cfs (4.9%)
- Sandy Run – 31.1 cfs (6.6%)
- Clear Run – 28.2 cfs (4.2%)
- Allen Creek – 25.5 cfs (5.4%)
- Kooser Run – 24.5 cfs (3.7%)

The above flow measurements were made on June 9 and 10, 2003. These flow measurements are one-time snapshots of stream flow made during a relatively wet year. They are not representative of median flow or low flow conditions. Table WR-2 lists measured flow for other tributaries and stream segments of Laurel Hill Creek. Since flow was not measured in several tributaries, this analysis is incomplete from a flow perspective.

Table WR-2. Flow characteristics of Laurel Hill Creek watershed streams as measured during the summer of 2003.

Stream	Date	Flow (cfs)	Percent of flow at Ursina on that date [1]
Allen Creek	06/10/03	25.5	5.4%
Ansell Run	flow not measured		
Blue Hole Creek	06/10/03	63.6	13.5%
Buck Run	flow not measured		
Clear Run	06/09/03	28.2	4.2%
Coke Oven Hollow	flow not measured		
Cole Run	06/10/03	4.3	0.9%
Crab Run	flow not measured		
Crab Run II (East of Allen Run)	flow not measured		
Cranberry Glade Run	flow not measured		
Crise Run	flow not measured		
Fall Creek	flow not measured		
Garys Run	flow not measured		
Green King Run	flow not measured		
Gross Run	flow not measured		
Harbaugh Run	flow not measured		
Jones Mill Run	06/09/03	33.0	4.9%
Keller Run	flow not measured		
Kooser Run	06/09/03	24.5	3.7%
Laurel Hill Creek at A0	06/24/03	8.9	4.6%
Laurel Hill Creek at A2	flow not measured		
Laurel Hill Creek at A3	06/23/03	96.1	40.4%
Laurel Hill Creek at A4	flow not measured		
Laurel Hill Creek at A4a	06/24/03	135.0	70.3%
Laurel Hill Creek at A5	06/24/03	165.8	86.3%
Laurel Hill Creek at A5a	06/12/03	281.0	90.1%
Laurel Hill Creek at A6	06/12/03	254.0	81.4%
Laurel Hill Creek at A7	06/24/03	207.7	108.2%
Laurel Hill Creek at A8	06/12/03	236.0	75.6%
Laurel Hill Creek at A9	06/27/03	142.2	124.7%
Lost Creek	07/02/02	5.6	9.5%
May Run	flow not measured		
Moore Run	flow not measured		
Mose King Run	flow not measured		
Paddytown Hollow	flow not measured		
Sandy Run	06/10/03	31.1	6.6%
Shafer Run	06/09/03	36.3	5.4%
Shanks Run	flow not measured		
Showman Run	flow not measured		
Smith Hollow	flow not measured		
Spruce Run	flow not measured		
Whipkey Run	06/10/03	13.8	2.9%

A0 is downstream of the bridge at east crossing of Duck Pond Road
A1 is Clear Run; data shown under Clear Run
A2 is at the Somerset Borough Water Treatment Plant
A3 is downstream of the bridge at Jimtown Road
A4 is downstream of the Laurel Hill State Park Wastewater Treatment Plant
A4a is downstream of the confluence with Allen Creek
A5 is at the Barronvale Covered Bridge
A5a is at King's Bridge
A6 is at the bridge below Whipkey Dam
A7 is at the Game Lands No. 111 access
A8 is at the covered bridge downstream of the confluence with Paddytown Hollow
A9 is below Lower Humbert Covered Bridge

[1] Fluctuating stream flows during June 2003 can result in percentages above 100% for the mainstem Laurel Hill Creek.

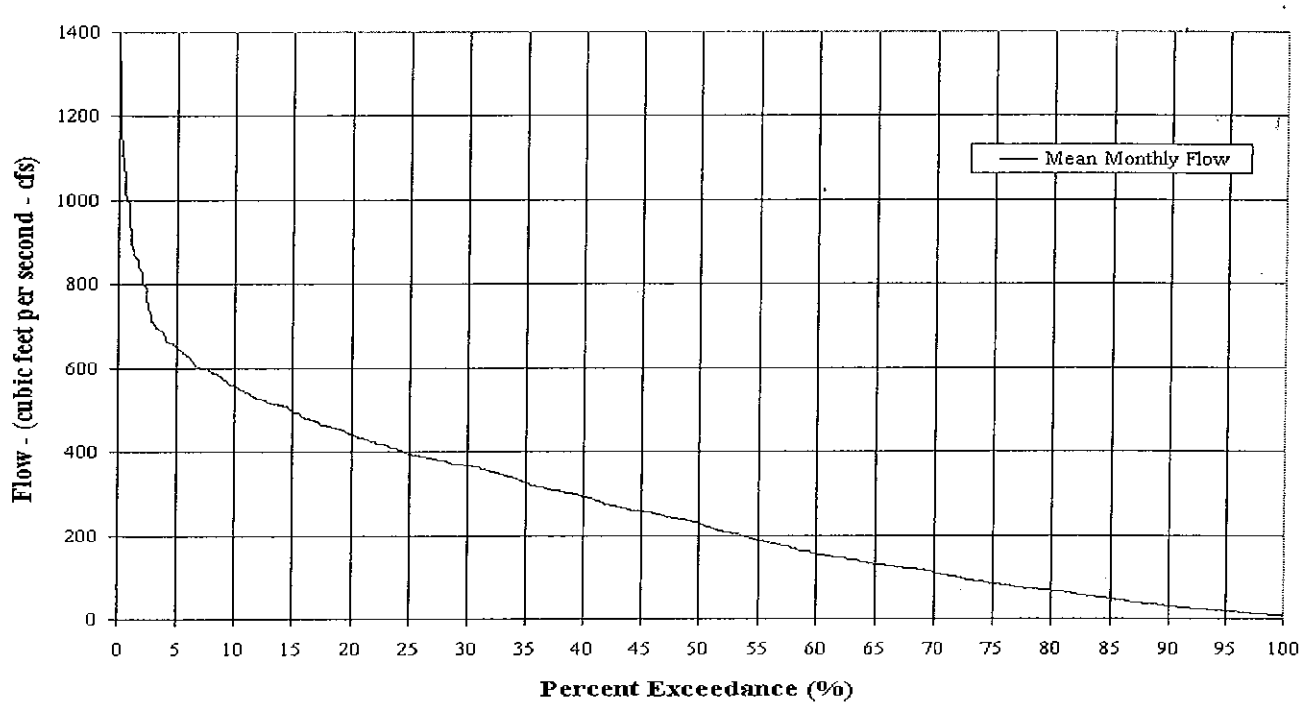
From a water quantity and water quality perspective, these seven streams have the greatest potential to impact the Main Stem of Laurel Hill Creek. Future changes in surface water and groundwater withdrawals, land use changes, and point and nonpoint source pollution in these streams and watersheds have the potential to impact not only to those tributaries, but to the Main Stem Laurel Hill Creek.

Streamflow in the Main Stem of Laurel Hill Creek is monitored by the USGS, with the flow monitoring point located at Ursina. Flow statistics at this location for the monitoring period from 1919 to 2002, are provided in Table WR-3. The average (mean) flow for Laurel Hill Creek at Ursina is 266 cfs, while the median flow (the value where half the measured flows are greater and half are less) is 228 cfs. Differences between medians and means are caused by the influence of extremely high flows on the average value. Graph WR-1 is a percent exceedance curve for Laurel Hill Creek. From this plot, one can determine that the flow is above 228 cfs for 50 percent of the time, while it is above 400 cfs only 25 percent of the time.

Table WR-3. Daily streamflow statistics for Laurel Hill Creek at Ursina, based on the period of record from 1919 to 2002 (source: USGS, 2004).

Month	Median Flow (cfs)	Mean Flow (cfs)	Minimum Flow (cfs)	Maximum Flow (cfs)
January	215	349	27	4600
February	250	403	37	4330
March	397	556	50	6980
April	335	443	48	3960
May	210	319	22	2860
June	96	188	8	5180
July	52	106	3	3530
August	36	94	4	3030
September	30	82	2	5640
October	42	114	4	5050
November	144	219	5	3550
December	220	326	9	4400
Overall	147	266	2	6980

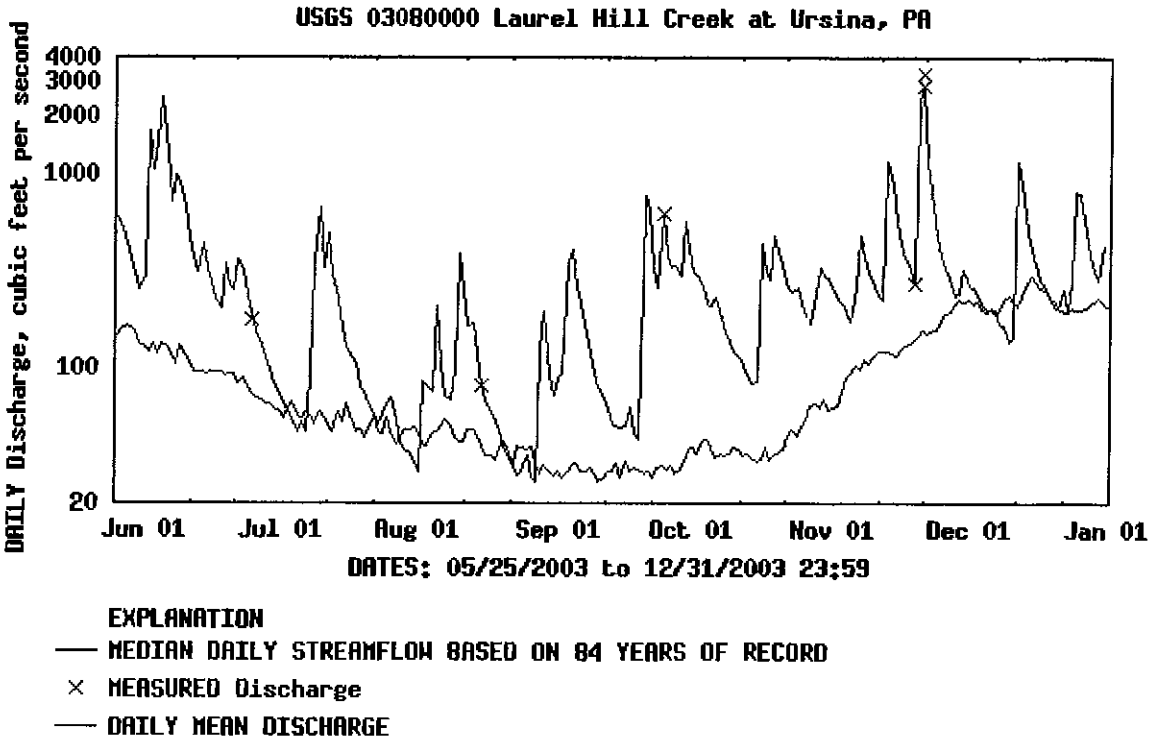
Graph WR-1. Percent exceedance graph for mean monthly streamflow for Laurel Hill Creek at Ursina, for the period of record from 1919 - 2002 (Source: USGS, 2004).



Flows in Laurel Hill Creek are highest in March and April (median daily flows of 397 and 335 cfs respectively). Periods of low flow typically occur in the June to October period (median daily flows from 30 to 96 cfs), with the lowest flows typically in September (median daily flow of 30 cfs). The absolute minimum flow recorded during the 1919 to 2002 period was 2 cfs, while the absolute maximum flow was 6,980 cfs (Table WR-3).

More recent flow data for Laurel Hill Creek are provided in Graph WR-2 for the June to December 2003 period. Flows during this recent time period are clearly greater than the median flows for the Creek based on the 84 years of recorded data. The flows measured as part of this River Conservation Plan, shown in Table WR-2, therefore represent flows that are above average.

Graph WR-2. Stream flow for Laurel Hill Creek at Ursina from June through December 2003. The stream monitoring during the June to September 2003 period represents above average flow conditions. Source of data is USGS (2004).



5.2 Low Flow Characteristics and Water Withdrawals

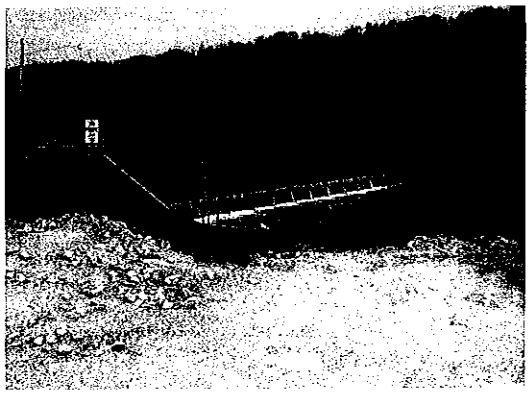
Stream flows in Laurel Hill Creek are lowest during the June through October Period (Graph WR-3), with median monthly flows less than 70 cfs during August through October. Monthly rainfall from June through September is at or above the overall monthly average, with October having the least rainfall of all the months.[1]

While evaporative losses from the stream are greatest during these summer months, there was clear concern among watershed stakeholders that there were additional losses of water from Laurel Hill Creek due to water withdrawals. Prevailing thoughts among stakeholders were that these low summer stream flows have been exacerbated in recent time because of surface and groundwater withdrawals in the upper portion of the Laurel Hill Creek Watershed.

There are several water withdrawals in the upper Laurel Hill Creek watershed that potentially could affect stream flows. These include a surface water withdrawal from Laurel Hill Creek by the Somerset Borough Municipal Authority, and groundwater withdrawals from the Shaffer Run wells. The current surface water withdrawal is

[1] Data from Penn State University, measured at Confluence, PA. Data from 1947 through 2003.

permitted for 1.75 million gallons per day (mgd), with an average daily usage of 1.3 million gallons. The minimum flow conservation release for Laurel Hill Creek at the Municipal Authority dam is 1.37 mgd.



The Pennsylvania Fish and Boat Commission has expressed concern as well regarding these surface and groundwater withdrawals and their effects on the ecology of Laurel Hill Creek (Young, 2002). An analysis of stream flow data for Laurel Hill Creek was completed as part of this River Basin Conservation Plan, utilizing flow data collected by the U.S. Geological Survey at their gauging station near Ursina. This analysis shows that the occurrence of low stream flows in Laurel Hill Creek has been substantially greater during the 1991 to 2003 period than during either the 1954 to 1990 time period (marking the beginning of surface water withdrawals by the Municipal Authority in 1954) or the 1918 to 1953 time period (prior to water withdrawals; see Graph WR-3). For instance, stream flows during the July through October time period were below 30 cfs about 54 percent of the time during the 1991 to 2003 time period, while they were below 30 cfs only 38 percent of the time during the 1954 to 1990 time period (Graph WR-3).

Rainfall statistics for the time periods shown in Graph WR-3 are as follows:

July through October	*Mean Monthly Rainfall (in)*	*Median Monthly Rainfall (in)*	*Percent of Months < 2.0 in.*	*Percent of Months < 2.5 in.*
1947 to 1953[1]	3.0	2.7	28.6%	46.4%
1954 to 1990	3.9	3.6	13.5%	21.6%
1991 to 2003	3.6	3.2	19.2%	32.7%

[1] Rainfall data collected since 1947.

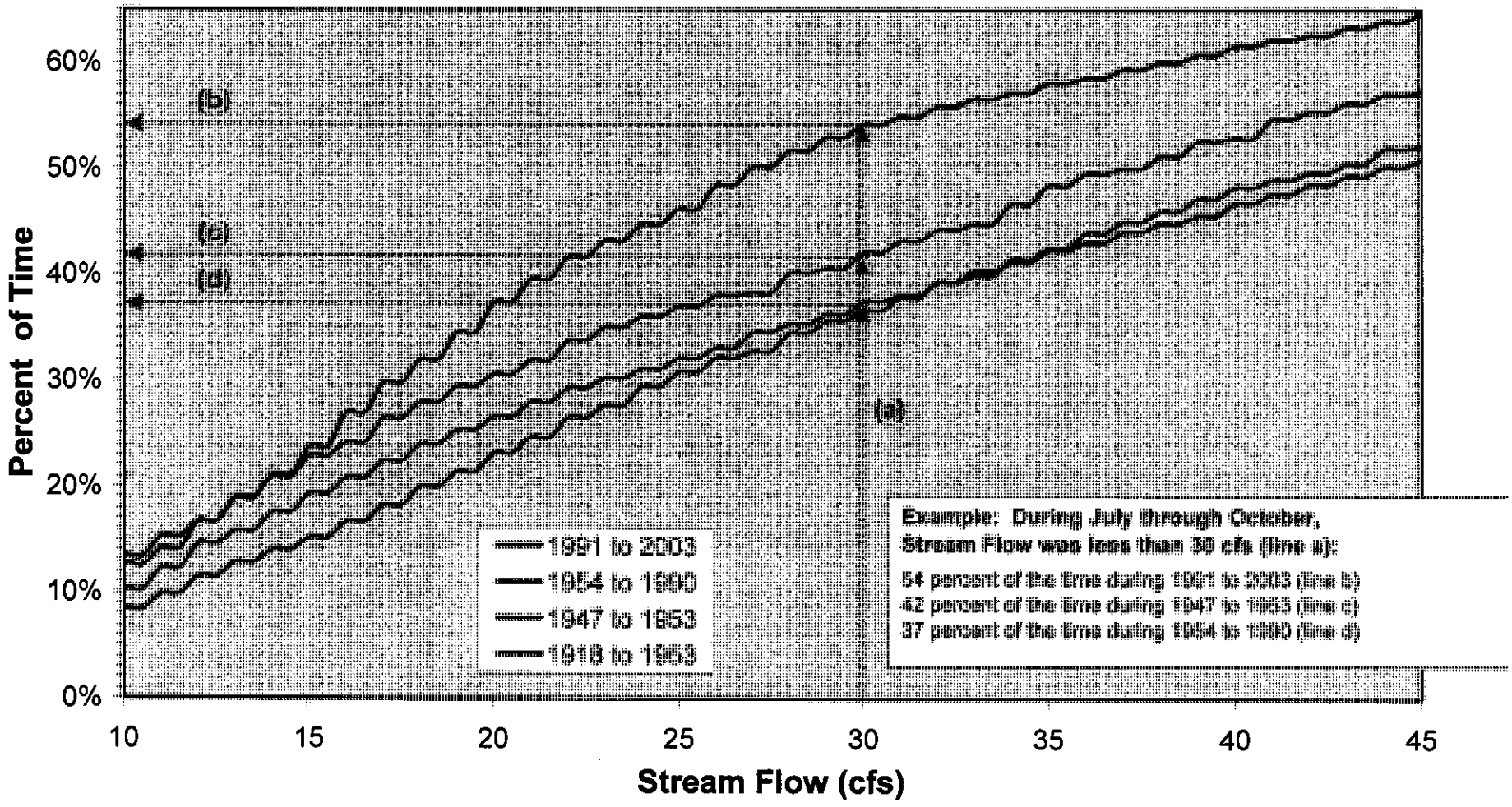
Precipitation does not fully explain the greater occurrence of low summer stream flows during the 1991 to 2003 time period (Graph WR-3). Rainfall was near normal, on average, during the 1991 to 2003 time period; average monthly rainfall for July through October is 3.7 inches. Rainfall during the 1947 to 1953 time period was significantly below normal, yet low stream flows occurred far less frequently than during the 1991 to 2003 time period.

While precipitation, and more specifically drought, has an important influence on the occurrence of low stream flows during the summer and early fall, the results in Graph WR-3 suggest that baseflow is also reduced. While baseflow is influenced by precipitation throughout the year, that does not explain the greater occurrence of low stream flows in 1991 to 2003. Precipitation during that time period, on an annual basis, was higher than all the other time periods considered in Graph WR-3.

The watershed stakeholders believe that surface and groundwater withdrawals are causing stream flows to be lower than what they recall historically, and that low stream flows are occurring more frequently. The analysis presented in Graph WR-3 indicates that their concerns have merit. A complete hydrologic analysis, encompassing both surface and groundwater inputs and withdrawals, is necessary to further address this pressing issue of low stream flows during late summer and early fall.

Another key recommendation in this plan is that a water needs assessment should be completed, and is critical to the future of the river basin. This assessment considers the ecological needs for water in the stream and adjacent wetlands, and balances those ecological needs with surface and groundwater withdrawals for consumptive uses. The greater occurrence of low stream flows in the 1991 to 2003 time period suggests that this balance may have been disrupted.

Graph WR-3. Low Stream Flow Frequencies for Laurel Hill Creek at Ursina during July through October, with Rainfall Statistics for Confluence1.



5.3 Stream Designations in the Watershed

The Commonwealth of Pennsylvania designates streams based on their intended use for fish, designating either sections or entire reaches of streams. Designated uses for aquatic life include coldwater fishery (CWF), warmwater fishery (WWF), trout stocked fishery (TSF), and migratory fishery (MF) PA Code 93.3, 2004. All of the designated uses have the same statewide list of water quality criteria for parameters such as alkalinity, iron, and pH, while each use differs with regard to dissolved oxygen (DO) and temperature requirements.

In addition to the fishery designation, the Commonwealth also can designate streams as either high quality (HQ) or exceptional value (EV) with respect to water quality status and maintenance of the water body. A stream or segment that is classified as HQ-CWF is referred to as a high quality coldwater fishery, indicating it has and requires higher water quality criteria for maintenance of the fishery. For instance, a stream designated as CWF has DO criteria of a minimum daily average of 6.0 mg/L and an absolute minimum of 5.0 mg/L, while a stream designated as HQ-CWF has a DO criterion of 7.0 mg/L minimum. All but four of the streams in the Laurel Hill Creek Watershed are designated as HQ-CWF (Table WR-4).

Table WR-4. Stream designations as established by the PADEP (2001).

Stream	Designation
Blue Hole Creek	EV
Cole Run	EV
Garys Run	EV
Jones Mill Run	EV
Allen Creek	HQ-CWF
Ansell Run	HQ-CWF
Buck Run	HQ-CWF
Clear Run	HQ-CWF
Coke Oven Hollow	HQ-CWF
Crab Run	HQ-CWF
Crab Run II (East of Allen Run)	HQ-CWF
Cranberry Glade Run	HQ-CWF
Crise Run	HQ-CWF
Fall Creek	HQ-CWF
Green King Run	HQ-CWF
Gross Run	HQ-CWF
Harbaugh Run	HQ-CWF
Keller Run	HQ-CWF
Kooser Run	HQ-CWF
Laurel Hill Creek	HQ-CWF
Lost Creek	HQ-CWF
May Run	HQ-CWF
Moore Run	HQ-CWF
Mose King Run	HQ-CWF
Paddytown Hollow	HQ-CWF
Sandy Run	HQ-CWF
Shafer Run	HQ-CWF
Shanks Run	HQ-CWF
Showman Run	HQ-CWF
Smith Hollow	HQ-CWF
Spruce Run	HQ-CWF
Whipkey Run	HQ-CWF

The four streams that are not HQ-CWF are designated EV streams, including Blue Hole Creek, Cole Run, Garys Run, and Jones Mill Run (Table WR-4). According to the PA Code 93.4b (2004) guidelines, a surface water is classified as an exceptional value (EV) water if it meets the requirements of a high quality (HQ) water, is of exceptional ecological significance, and meets one or more of the following requirements:

- The water is located in a national wildlife refuge or a state game propagation and protection area.
- The water is located in a designated state park natural area or state forest natural area; national natural landmark; federal or state wild river; federal wilderness area; or national recreational area.
- The water is an outstanding national, state, regional or local resource water.
- The water is a surface water of exceptional recreational significance.

The water achieves a score of at least 92% (or its equivalent) using the methods and procedures described in "Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish" (Plafkin et al., 1989), as updated and amended or using other widely accepted and published peer-reviewed biological assessment procedures.

The water is designated as a "wilderness trout stream" by the Fish and Boat Commission following public notice and comment.

The Commonwealth also designates certain streams or stream segments as impaired, through the State's 305(b) and associated 303(d) programs as required by the Environmental Protection Ageucy. In the Laurel Hill Creek Watershed, 32.5 miles of stream (maiu stem and tributary segments) have been designated as impaired, requiring the development of TMDLs (Total Maximum Daily Loads). The causes for the impaired designations are organic enrichment, low dissolved oxygen, and siltation. The sources of pollution leading to these impairments are from agricultural crop production and agricultural grazing impacts.

5.4 Historic Water Quality Review

A thorough review of existing water quality within the Laurel Hill Creek Watershed was conducted, gathering both older and more recent data. The historic data were gathered from sources such as the PADEP, Pennsylvania Fish and Boat Commission (PFBC), STORET (EPA national water quality database), and various academic or other published reports. These data were then summarized into tables, with one table for each tributary and for the Main Stem of Laurel Hill Creek. Historical data for water quality consisted of parameters such as pH, acidity, alkalinity, hardness, conductivity, nitrate, phosphate, and total suspended solids.

Approximately 15 of the 32 named streams in the Laurel Hill Creek Watershed had minimal to no existing water quality, macroinvertebrate, or fishery data. Some of the streams with no historical information include Shanks Run, Whipkey Run, Paddytown Hollow, Lost Creek, Mose King Run, Keller Run, and Garys Run.

The streams with the most historic data were Allen Creek, Blue Hole Creek, Clear Run, Cole Run, Cranberry Glade Run, Fall Creek, Gross Run, Harbaugh Run, Jones Mill Run, Kooser Run, Laurel Hill Creek, Sandy Run, and Shaffer Run. Historic data for these streams are compared to current water quality data in Section 5.5.1.

5.5 New Water Quality Monitoring Data

A snapshot of water quality in the Laurel Hill Creek Watershed was developed as part of this River Basin Conservation Plan. Water quality data, in conjunction with streamflow, habitat assessment, and benthic data, were collected in the fall of 2002 and primarily in the summer of 2003. Water quality data were collected with the help of staff and interns from the Somerset County Conservation District and the PADEP.

Snapshot data were collected at 14 sites along the Main Stem of Laurel Hill Creek, and on 12 tributary streams in the watershed. Sampling times and the type of data collected at each site are shown in Table WR-5. The actual water quality, benthic, and habitat assessment data are provided in Appendix B, organized by stream. Water quality findings from this snapshot survey are described in Section 3.5 (Water Quality Assessment).

Table WR-5. Field monitoring sites and parameters evaluated as part of this River Conservation Plan.

Stream	Sampling Sites	Sampled In: Nov 2002	Summer 2003	Sep 2003	Assessments Made: Flow	Habitat	Benthics	Water Quality	Additional Description of Locations
Mainstem Stations									
Laurel Hill Creek: First crossing at Laurel Run Road	1			X				X	
Laurel Hill Creek: A.0 (east crossing at Duck Pond Road)	1		X		X	X	X	X	Downstream of bridge
	1			X		X	X	X	
Laurel Hill Creek: West crossing at Duck Pond Rd	1			X		X	X	X	
Laurel Hill Creek: A.2 (Somerset Borough Filtration Plant)	1			X				X	
Laurel Hill Creek: A.3 (Jimtown Bridge)	1		X		X	X	X	X	Below bridge
	1	X						X	At bridge
	1			X		X	X	X	
Mainstem Stations									
Laurel Hill Creek: A.4 (downstream of Laurel Hill State Park WWTP)	1		X			X	X	X	
Laurel Hill Creek: A.4a (downstream of Allen Creek confluence)	1		X		X	X	X	X	
Laurel Hill Creek: A.5 (Barronvale Bridge)	1		X		X	X	X	X	Below bridge
Laurel Hill Creek: A.5a (King's Bridge)	1		X		X	X	X	X	Downstream of King's Bridge
Laurel Hill Creek: A.6 (bridge below Whipkey Dam)	1		X		X	X	X	X	Below Whipkey Dam bridge
Mainstem Stations									
Laurel Hill Creek A.7 (State Game Lands 111 access)	1		X		X	X	X	X	Game Lands 111 access
Laurel Hill Creek: A.8 (covered bridge downstream of Paddytown Hollow confluence)	1		X		X	X	X	X	Below bridge
Laurel Hill Creek: A.9 (below Lower Humbert Covered Bridge)	1		X		X	X	X	X	Below Lower Humbert Covered Bridge
Laurel Hill Creek: at Ursina Bridge	1			X				X	
Tributary Stations									
Allen Creek	1		X		X	X	X	X	
Ansell Run	Unassessed								
Blue Hole Creek	1		X		X	X	X	X	Upstream of bridge
	1			X		X	X		At road crossing
Buck Run	Unassessed								
Clear Run	1		X		X	X	X	X	
Coke Oven Hollow	Unassessed								
Cole Run	1		X		X	X	X	X	Downstream of bridge (Forbes State Forest)
	1			X		X	X		At road crossing
Crab Run (near Allenville)	Unassessed								
Crab Run (near Barronvale)	Unassessed								

Table WR-5 – Continued. Field monitoring sites and parameters evaluated as part of this River Conservation Plan.

Stream	Sampling Sites	Sampled in:			Assessments Made:				Additional Description of Locations
		Nov 2002	Summer 2003	Sep 2003	Flow	Habitat	Benthics	Water Quality	
Tributary Stations									
Cranberry Glade Lake	Unassessed								
Cranberry Glade Run	1		X			X	X	X	Just upstream of A7
	1			X				X	Just below lake
Crise Run	Unassessed								
Fail Creek	Unassessed								
Garys Run	Unassessed								
Green King Run	Unassessed								
Gross Run	Unassessed								
Harbaugh Run	Unassessed								
Jones Mill Run	1		X		X	X	X	X	
Keller Run	Unassessed								
Tributary Stations									
Kooser Run	1		X		X	X	X	X	Upstream of ponds
	1	X						X	At Route 31 crossing
Laurel Hill Lake	Unassessed								
Lost Creek	1		X		X	X	X	X	Downstream of Scottyland WWTP
	1			X				X	Upstream of Scottyland WWTP
	1			X				X	At Scottyland WWTP
	1			X		X	X	X	Downstream of Scottyland WWTP
May Run	Unassessed								
Moore Run	Unassessed								
Mose King Run	Unassessed								
Tributary Stations									
Paddytown Hollow	1		X			X	X	X	Downstream of bridge (Humbert Road crossing)
	1			X				X	
Sandy Run	1		X		X	X	X	X	Downstream of bridge (Sandy Run Road)
	1			X		X	X	X	
Shafer Run	1		X		X	X	X	X	Below bridge (Bakersville-Edie Road)
Shanks Run	Unassessed								
Showman Run	Unassessed								
Smith Hollow	Unassessed								
Spruce Run	Unassessed								
Whipkey Run	1		X		X	X	X	X	Downstream of Green King Run confluence

Three of the fifteen streams that have little or no historical water quality information were assessed during these field studies, including Lost Creek, Paddytown Hollow, and Whipkey Run. All three streams were assessed for water quality, benthic macroinvertebrates, and habitat as part of this snapshot survey.

Fourteen sites on the Main Stem of Laurel Hill Creek and 15 sites on 12 different tributary streams were monitored for water quality at least once during the three data collection events in 2002 to 2003. Lost Creek and Cranberry Glade Run each had multiple locations where water quality data were collected. On the Lost Creek, data were collected at three different locations relative to the Scottyland wastewater treatment plant (WWTP) discharge to provide an assessment of its impact on stream water quality. One sampling location was upstream of the discharge, one was right at the discharge point, and another was just downstream of the discharge. Cranberry Glade Run had two locations where data were collected, one immediately downstream of the outfall from Cranberry Glade Lake and another further downstream of the outfall, closer to the Laurel Hill Creek confluence.

5.6 Water Quality Assessments

The new (snapshot) water quality data were reviewed to develop assessments of water quality for each stream that was sampled in the watershed. Parameters measured during the 2002 to 2003 snapshot sampling included pH, conductivity, DO, temperature, nitrate, phosphate, and ammonia. These data are presented in Table WR-6 for the Main Stem Laurel Hill Creek sampling sites and in Table WR-7 for the tributary sites. Metals data were also collected by the PADEP for Clear Run and Main Stem Laurel Hill Creek sites; these data are provided in Table WR-8.

Table WR-6. Water quality data for the mainstem Laurel Hill Creek stations collected during the development of this River Conservation Plan.

Sampling Site	Water Quality Assessment	pH[1]	pH[3]	Cond[1]	DO[1]	Temp[1]	Temp[3]	NO_3[1]	NO_3[2]	PO_4[1]	PO_4[2]	PO_4[3]	NH_4[2]	NH_4[3]
Laurel Hill Creek: First crossing at Laurel Run Road	*Fair*		7.2				67.5					0.03		0.05*
Laurel Hill Creek: A.0 (east crossing at Duck Pond Road)	*Fair*	6.4	7.3	158	7.3	70.8	67.5	2.0*		1.5*		0.02		0.07*
Laurel Hill Creek: West crossing at Duck Pond Road	*Good*		7.3				66.2					0.08		0.025
Laurel Hill Creek: A.2 (Somerset Borough Filtration Plant)	*Good*		7.4				64.6					0.06		0.01
Laurel Hill Creek: A.3 (Jimtown Bridge)	*Good*	6.5	7.3	154	9.6	69.6	60.6	0.5	0.28	0	0.02	0.10	0.03	0.005
Laurel Hill Creek: A.4 (downstream of Laurel Hill State Park WWTP)	*Good*	6.5		131	9.1	70.4				0				
Laurel Hill Creek: A.4a (downstream of Allen Creek confluence)	*Good*	6.6		256	9.7	66.5		0.5		0				
Laurel Hill Creek: A.5 (Barronvale Bridge)	*Good*	6.6		115	7.4	68.4		0.5		0				
Laurel Hill Creek: A.5a (King's Bridge)	*Good-Fair*	6.8		102	9.4	69.2		1.5*		0				
Laurel Hill Creek: A.6 (bridge below Whipkey Dam)	*Good*	6.6		101	9	67.2		0.5		0				
Laurel Hill Creek: A.7 (State Game Lands 111 access)	*Good*	6.7		112	8.7	71.5		0.5		0.25				
Laurel Hill Creek: A.8 (covered bridge downstream of Paddytown Hollow confluence)	*Good-Fair*	6.5		94	10.7	65.4		1.75*		0.25				
Laurel Hill Creek: A.9 (below Lower Humbert Covered Bridge)	*Excellent-Good*	6.85		128	8.5	67.5		0.25		0.25				
Laurel Hill Creek at Ursina Bridge	*Fair*		8.1*				70.3*					0.11*		

[1] Collected by SCCD June-July 2003 (nutrients measured using a color comparator kit)

[2] Collected by Kleinschmidt November 2002 (nutrients measured using a colorimeter)

[3] Collected by Kleinschmidt September 2003 (nutrients measured using a colorimeter)

*Water quality assessment based primarily on this parameter(s)

Water Quality Assessment Categories:

Excellent	Low NO_3 (<0.25), PO_4 (<0.05), and NH_4 levels (<0.01), neutral pH (7.0+/-0.3), and/or near saturation DO levels (>7.0)
Good	Low to moderate NO_3 (<0.50), PO_4 (<0.10), and NH_4 levels (<0.03), near neutral pH (6.5-7.5), and/or elevated DO levels (>6.0)
Fair	Moderate NO_3 (0.50-1.0), PO_4 (0.10-0.25), and NH_4 levels (0.03-0.10), elevated or depressed pH levels (5.5-8.5), and/or slightly depressed DO levels (>5.0)
Poor	High NO_3 (>1.0), PO_4 (>0.10), and NH_4 levels (>0.10), acidic or basic pH conditions (<5.5 or >8.5), depressed DO levels (<5.0)

Table WR-7. Water quality data for tributaries to Laurel Hill Creek. Data collected during the development of this River Conservation Plan.

Sampling Site	Water Quality Assessment	pH[1]	pH[2]	Cond[1]	DO[1]	Temp[1]	Temp[2]	NO_3[1]	NO_3[2]	PO_4[1]	PO_4[2]	PO_4[3]	NH_4[2]	NH_4[3]
Allen Creek	*Good*	6.6		198	10.7	62		0.25		0.5				
Blue Hole Creek	*Excellent-Good*	6.8	6.8	27	10.3	62.8	60.8	0.25		0.5				
Clear Run	***Good-Fair*	6.8		233	10.2	63		0.25		0.5				
Cole Run	*Poor*	4.3	4.8*	33	8.9	61.5	61.2	0		0.5				
Cranberry Glade Run	*Good*	6.8		68	6.8									
Cranberry Glade Run just downstream of lake outfall	*Poor*		4.5*				60.4					0.22*		
Jones Mill Run	*Good-Fair*	5.9*		122	9.2	63.5		0.25		0.5				
Kooser Run	*Good-Fair*	6.6		202	10.2	64		0.5	0.37*	0.5	0.14*		0.01	
Lost Creek upstream of Scottyland WWTP outfall	*Good-Fair*		7.7				65.5					0.10*		0.02
Scottyland WWTP outfall at Lost Creek	*Poor*		7				66.9					5.22*		0.0
Lost Creek downstream of Scottyland WWTP outfall	*Good-Fair*	6.9	7.6	123	8.7	70.5	64.2			0		0.11*		
Paddytown Hollow	*Fair*	6.8	7.7	14	9.6	68.6	61.5			<1		0.23*		
Sandy Run	*Good*	6.8	6.0	42	10.5	66.7	63.9	0.25		0		0.05		0.005
Shafer Run	*Good*	6.6		53	10	62.4		0.25		0.5				
Whipkey Run	*Excellent-Good*	6.8		40	9.5	63.7		0.25		0.25				

[1] Collected by SCCD June-July 2003 (nutrients measured using a color comparator kit)

[2] Collected by Kleinschmidt November 2002 (nutrients measured using a colorimeter)

[3] Collected by Kleinschmidt September 2003 (nutrients measured using a colorimeter)

*Water quality assessment based primarily on this parameter(s)

**The water quality assessment was based on additional 2003 data on chloride concentrations (highway runoff)

Water Quality Assessment Categories:

Excellent	Low NO_3 (<0.25), PO_4 (<0.05), and NH_4 levels (<0.01), neutral pH (7.0+/-0.3), and/or near saturation DO levels (>7.0)
Good	Low to moderate NO_3 (<0.50), PO_4 (<0.10), and NH_4 levels (<0.03), near neutral pH (6.5-7.5), and/or elevated DO levels (>6.0)
Fair	Moderate NO_3 (0.50-1.0), PO_4 (0.10-0.25), and NH_4 levels (0.03-0.10), elevated or depressed pH levels (5.5-8.5), and/or slightly depressed DO levels (>5.0)
Poor	High NO_3 (>1.0), PO_4 (>0.10), and NH_4 levels (>0.10), acidic or basic pH conditions (<5.5 or >8.5), depressed DO levels (<5.0)

Table WR-8. Metals data for mainstem Laurel Hill Creek sites measured in 2003. Clear Run was also sampled.

Parameter	Units	Laurel Hill Creek A0	Clear Run	Laurel Hill Creek A2	Laurel Hill Creek A3	Laurel Hill Creek A4	Laurel Hill Creek A4A	Laurel Hill Creek A5	Laurel Hill Creek A5A	Laurel Hill Creek A6	Laurel Hill Creek A7	Laurel Hill Creek A8	Laurel Hill Creek A9
pH	pH units	7.2	7	7.2	7.1	7	7.3	7.6	7.8	7.3	7.6	7.5	7.7
Alkalinity	mg/L	57.2	12.2	25.8	26.2	23.8	25	21.6	20.6	26.4	21	20.8	20.2
Arsenic D	ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Lead D	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium D	ug/L	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Hot Acidity	mg/L	0	0	0	0	0	0	0	0	0	0	0	0
Mercury D	ug/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Specific Con	umhos/cm	197.7	39.1	212	201	167.1	198.1	160.5	158.6	165	146.5	151.1	143.3
Calcium D	mg/L	21.5	11.8	12.4	13.5	11.4	13.6	11.4	11.1	12.5	9.86	11.2	10.4
Magnesium D	mg/L	5.02	2.89	2.60	2.30	2.03	2.36	1.97	2.00	2.19	1.84	2.22	1.98
Sodium D	mg/L	8.2	51.1	21.4	18.5	15.3	18.4	14.6	13.7	14.2	12.8	12.4	12.3
Potassium D	mg/L	2.61	<1	1.24	1.23	1.36	1.31	<1.00	1.35	1.13	<1.00	1.4	1.28
Cadmium D	ug/L	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Chromium D	ug/L	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Copper D	ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Iron D	ug/L	258	21	517	416	240	161	103	61	98	36	20	44
Manganese D	ug/L	272	31	120	105	42	18	<10	11	170	<10	11	<10
Nickle D	ug/L	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Zinc D	ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aluminum D	ug/L	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
TDS @ 105 C	mg/L	164	256	150	158	120	138	120	156	110	100	96	94
T SUSP Solids	mg/L	10	14	2	2	4	4	<2	<2	2	4	<2	<2
Chloride	mg/L	16.3	190	44.5	38.8	31.1	40.4	30.5	29.8	28.5	26.4	24.7	23.9
Sulfate T	mg/L	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	28.5	28.6
Field Test (pH)	pH units	6.3	6.7	6.7	6.9	7	7.1	7.4	8.2	7.5	7.4	7.6	8.1
D indicates dissolved fraction													
T indicates total fraction													

An overall water quality assessment is provided for each site that was sampled during the snapshot survey. The assessment is based on the water quality data collected for the snapshot survey. Categories for the water quality assessment included excellent, good, fair, and poor, with borderline assessments categorized using both terms, e.g., excellent-good or good-fair. While these water quality assessments are based on the current data collected, the historic water quality, benthic, and habitat assessment data were used in conjunction with current data to develop the stream health assessments described later in the plan (see Table BR-5).

Table BR-5. Stream health assessment of the mainstem Laurel Hill Creek and twelve tributaries based on historic data and 2002-2003 field monitoring conducted as part of this River Conservation Plan.

Stream	Overall Stream Health	Habitat Assessment	Benthic Assessment	Water Quality Assessment	Historic Data Synopsis
Mainstem Stations					
Laurel Hill Creek @ 1st crossing of Laurel Run Rd	Fair	---------- Unassessed ----------		Fair	Elevated nitrates and moderately low pH/alkalinity levels, but PFBC data has shown an improvement in WQ in upper reaches from 1978 to 1994 with sedimentation problems still present, relatively high invertebrate diversity/abundance especially in lower reaches, trout present (stocked).
Laurel Hill Creek A.0 (east crossing of Duck Pond Rd)	Fair	Fair	Excellent-Good	Fair	
Laurel Hill Creek @ west crossing of Duck Pond Rd	Good	--- Unassessed ---	Excellent	Good	
Laurel Hill Creek A.2 (Somerset Boro Filtration Plant Reservoir)	Good	---------- Unassessed ----------		Good	
Laurel Hill Creek A.3 (Jimtown Bridge)	Good-Fair	Fair-Poor	Excellent	Good	It was not possible to correlate the historic data to the stations used in 2002-2003. However, the historic data support the findings of the 2002-2003 field monitoring data collection.
Laurel Hill Creek A.4 (d.s. of Laurel Hill State Park WWTP)	Excellent-Good	Excellent-Good	Excellent	Good	
Laurel Hill Creek A.4a (d.s. of Allen Creek confluence)	Good	Good	Good	Good	
Laurel Hill Creek A.5 (Barronvale Bridge)	Good	Good	Excellent	Good	
Laurel Hill Creek A.5a (King's Bridge)	Good	Good	Excellent	Good-Fair	
Laurel Hill Creek A.6 (bridge below Whipkey Dam)	Good	Good	Excellent	Good	
Laurel Hill Creek A.7 (Game Lands 111 Access)	Good	Good	Excellent	Good	
Laurel Hill Creek A.8 (covered bridge d.s. of Paddytown Hollow confluence)	Good	Good	Excellent	Good-Fair	See notes above.
Laurel Hill Creek A.9 (below Lower Humbert Covered Bridge)	Excellent-Good	Good	Excellent	Excellent-Good	
Laurel Hill Creek @ Ursina Bridge	Fair	---------- Unassessed ----------		Fair	
Tributary Stations					
Allen Creek	Excellent	Excellent	Excellent	Good	Elevated nutrient levels, high density of invertebrates, reproducing trout pop.
Ansell Run	Fair[1]	---------- Unassessed ----------			High Al conc & low pH, no fish (one data set)
Blue Hole Creek	Excellent	Excellent	Excellent	Excellent-Good	Low alkalinity/hardness, acid tolerant invertebrates, reproducing brook trout
Buck Run	Fair[1]	---------- Unassessed ----------			Reduced pH and alkalinity, invertebrates limited by low pH, reproducing brook trout in upper reaches
Clear Run	Fair	Excellent-Good	Fair-Poor	Good-Fair	Low alkalinity & high cond., limited invertebrate diversity, reproducing trout pop.
Coke Oven Hollow	---------- Unassessed ----------				No Data
Cole Run	Good-Fair	Excellent	Excellent-Good	Poor	Low pH/alkalinity/hardness, avg number of invertebrate taxa collected, no fish
Crab Run (near Allenville)	Good[1]	---------- Unassessed ----------			Good WQ (one set of data)
Crab Run (near Barronvale)	---------- Unassessed ----------				No Data
Cranberry Glade Lake	Fair[1]	---------- Unassessed ----------			Low alkalinity, no trout (96-97)

Table BR-5 - Continued. Stream health assessment of the mainstem Laurel Hill Creek and twelve tributaries based on historic data and 2002-2003 field monitoring conducted as part of this River Conservation Plan.

Stream	Overall Stream Health	Habitat Assessment	Benthic Assessment	Water Quality Assessment	Historic Data Synopsis
Cranberry Glade Run	Excellent-Good	Good	Excellent	Good	Low pH/alkalinity/hardness, questionable fish pop.
Cranberry Glade Run (d.s. of Cranberry Glade Lake outfall)	Poor	---------- Unassessed ----------		Poor	See above
Crise Run	Fair[1]	---------- Unassessed ----------			Low pH/alkalinity/hardness (one data set)
Fall Creek	Fair[1]	---------- Unassessed ----------			Reduced pH/alkalinity/hardness levels, questionable fish pop.
Garys Run	---------- Unassessed ----------				No Data
Green King Run	---------- Unassessed ----------				No Data
Gross Run	Poor[1]	---------- Unassessed ----------			Low pH/alkalinity/hardness, acid tolerant invertebrates, no fish (high Al conc.)
Harbaugh Run	Fair[1]	---------- Unassessed ----------			Low alkalinity/hardness, questionable fish pop. (1978-1980)
Jones Mill Run	Excellent-Good	Excellent	Excellent	Good-Fair	High nitrates, high density of invertebrates, reproducing trout pop.
Keller Run	---------- Unassessed ----------				No Data
Kooser Run	Good-Fair	Excellent	Excellent	Good-Fair	High nitrates, moderately high invertebrate density, stocked trout pop.
Laurel Hill Lake	---------- Unassessed ----------				No Data
Lost Creek (u.s. of Scottyland WWTP outfall)	Good	--- Unassessed ---	Excellent	Good-Fair	See below
Lost Creek (at Scottyland WWTP outfall)	Poor	---------- Unassessed ----------		Poor	See below
Lost Creek (d.s. of Scottyland WWTP outfall)	Good-Fair	Good	--- Unassessed ---	Good-Fair	Good WQ (just above confluence with LHC)
May Run	Fair[1]	---------- Unassessed ----------			Moderately low pH/alkalinity (1997)
Moore Run	---------- Unassessed ----------				No Data
Mose King Run	---------- Unassessed ----------				No Data
Paddytown Hollow	Fair	Good-Fair	Excellent-Good	Fair	No Data
Sandy Run	Excellent-Good	Excellent-Good	Excellent	Good	Low pH/alkalinity/hardness, low invertebrate diversity, presence of trout pop. (1977-1982)
Shafer Run	Excellent-Good	Excellent-Good	Excellent	Good	High nitrates, moderate invertebrate density, reproducing trout pop.
Shanks Run	---------- Unassessed ----------				No Data
Showman Run	---------- Unassessed ----------				No Data
Smith Hollow	---------- Unassessed ----------				No Data
Spruce Run	Poor[1]	---------- Unassessed ----------			Low pH & no fish (1987)
Whipkey Run	Excellent-Good	Good	Excellent-Good	Excellent-Good	No Data

[1] Overall Health Assessment is based on historical data only. Stream health conditions may have changed since the historic data were collected.

Overall, water quality assessments for sites along the Main Stem of Laurel Hill Creek are categorized as "good" (Table WR-6). The two most upstream sites, however, were assessed as having "fair" water quality. These two sites were (1) where Laurel Hill Creek crosses Laurel Run Road, and (2) at the east crossing of Duck Pond Road with Laurel Hill Creek. Nutrient concentrations (ammonia, phosphate, and nitrate) were all found to be high at these locations. The next site downstream, at the west crossing of Duck Pond Road, was categorized as "good". By this point, the water in Laurel Hill Creek has been significantly diluted by better quality water (based on nutrients) from Clear Run.

The "fair" upstream water quality assessments are related to agricultural impacts from crop production and grazing, causing the input of sediment and nutrients to the stream. These findings corroborate those found by the PADEP in their designations of impairment for Laurel Hill Creek.

Further downstream, sites along the Main Stem of Laurel Hill Creek are categorized as "good", except for the site at Kings Bridge, the site below the confluence with Paddytown Hollow, and the site at Ursina Bridge (Table WR-6), where they were categorized as "good to fair" and "fair" (Ursina). Nutrients were high at the first two sites, while temperature and phosphate were high at the Ursina site. For the Main Stem sites below Kings Bridge and Paddytown Hollow, these high nutrient concentrations may be related to higher nutrients coming in from Lost Creek (confluence upstream from Kings Bridge) and from Paddytown Hollow (confluence just upstream). Temperature was high at the Ursina site because of the wide stream channel with low canopy cover in that area. pH and phosphate were also elevated at the Ursina site. Causes for these findings are not known.

Water quality assessment for the tributaries ranged from "excellent to good" to "poor" (Table WR-7). Both Blue Hole Creek and Whipkey Run were categorized as having "excellent to good" water quality. Allen Creek, Cranberry Glade Run (downstream site), Sandy Run, and Shaffer Run were all categorized as having "good" water quality.

The downgraded water quality assessments for the rest of the tributaries are either related to pH or nutrients. Cole Run is rated as having "poor" water quality because of its low pH (4.8), and Jones Mill Run is rated as "good to fair" because of its low pH (5.9) as well. Cranberry Glade Run, just downstream from Cranberry Glade Lake, is rated as "poor" because of low pH (4.5) and high nutrients. The low pH at all these sites may be natural (i.e., not anthropogenic) because of geologic conditions at Cole Run and Jones Mill Run or ecological conditions (natural bog) at Cranberry Glade Run.

Kooser Run, Lost Creek, and Paddytown Hollow all have high nutrient concentrations that result in "good to fair" to "poor" ratings for these sites. The nutrients in Kooser Run are likely sequestered in Kooser Lake and probably

do not impact Laurel Hill Creek. Nutrients in Lost Creek and Paddytown Hollow, however, may have an impact on Laurel Hill Creek. Nutrient concentrations at Main Stem Laurel Hill Creek sites below these confluences are all elevated.

Clear Run is categorized as having "good to fair" water quality because of very high sodium (51.1 mg/L) and chloride (190 mg/L) concentrations. These elements likely enter Clear Run from turnpike runoff during spring as a result of winter ice road treatments. It is believed that these high sodium and chloride concentrations impact the benthic macroinvertebrate communities (described in the Biological Resources section).

5.7 Historic and 2003 Snapshot Water Quality Comparisons

Water quality data from historic sampling events are compared to results from the current snapshot survey for streams that have both current and historic data for comparison. The data are generally not adequate for statistical trend analyses, as sampling sites, methods, and times of year vary considerably between surveys on the same stream. However, a qualitative review of historic data in general was made and compared to the findings of the current snapshot survey. Differences between historic and current assessments are noted below. These differences point to potential areas of concern or improvement in stream conditions, and warrant further action in terms of increased monitoring, impact assessments, or restoration actions.

Allen Creek. The current water quality assessment for Allen Creek is good (Table 5.6). pH was, however, slightly below neutral (6.6), but dissolved oxygen and conductivity were high, and water temperature was low. Nutrients were in low concentrations as well. Historically, surveys have found that Allen Creek was degraded from high biochemical oxygen demand (BOD) and high nitrogen and phosphorus concentrations at a location just below the Seven Springs sewage treatment plant (Weirich and Boyer, 1988). Weirich and Boyer (ibid.) noted, however, that water quality conditions were normal further downstream from the sewage treatment plant. The current snapshot water quality survey, conducted as part of this river basin conservation plan, was made at a location much further downstream from this historic sampling location, near the confluence with Laurel Hill Creek.

Blue Hole Creek. This stream is rated as good to excellent for water quality, based on the current water quality assessment. pH is slightly acidic at 6.8, but all other parameters are excellent. Conductivity is low, however, and coupled with low alkalinities measured historically, indicates poor buffering capacity of the stream. While water quality is very good, the stream has little capacity to absorb negative environmental impacts. pH appears to have improved slightly over the last several decades.

Clear Run. The current water quality assessment for this stream is good to fair, primarily based on high conductivities influenced by very high chloride and, to a lesser extent, sodium concentrations (Table 5.8).

Alkalinity is also very low, pointing to poor buffering capacity of the stream. These findings are supported by historic surveys, and point to Pennsylvania Turnpike road salting impacts on the stream (Boyer et. al., 1987; Largent, 1989).

Cole Run. Cole Run water quality is classified as poor by the current survey. This poor classification is based entirely on very low pH and low alkalinity. The currently measured pH, 4.3, is similar to pH measurements made historically, which ranged from 4.3 to 5.0. Alkalinity has been historically low as well.

Cranberry Glade Run. Cranberry Glade Run, in the downstream segment near Laurel Hill Creek, has good water quality based on the current assessment. pH, as for most tributary streams in this watershed, is slightly acidic at 6.8. Dissolved oxygen, while adequate, is less than many other streams in the watershed. In the upstream segment of Cranberry Glade Run, however, water quality is rated as poor. This poor rating is based on low pH (4.5) and high phosphate concentrations. The upstream survey site is in a bog just downstream from the outfall from Cranberry Glade Lake. It is unclear whether the low pH is a natural result of acidic conditions in the bog. Historic data is sparse, but does corroborate the low pH values in the upstream segment of the stream, with higher pH's in the downstream segment. There has only been one measurement of phosphorus historically in Cranberry Glade Run, in the upstream segment, and that measurement showed a low total phosphorus concentration. Conditions in the upstream segment of Cranberry Glade Run, therefore, appear not to be improving and may be getting worse from a nutrient perspective.

Jones Mill Run. The water quality in Jones Mill Run is currently assessed as good to fair, based almost entirely on the low pH (5.9) measured during the current survey. This result may be an anomaly, however, as all historic pH data show near neutral conditions (6.4 to 7.3). However, nitrate concentrations, historically, have been high. The source of this historic nitrate is not known, but spray irrigation impacts have been postulated as a cause. Further testing for both nutrients and pH is warranted. Alkalinity is relatively low, and the stream is therefore somewhat poorly buffered. Water quality in Jones Mill Run has historically been characterized as excellent.

Kooser Run. The current water quality in Kooser Run is rated as good to fair, largely because of high nutrient (nitrate and phosphate) concentrations. pH was also slightly acidic at 6.6. The milky conditions of the water, indicative of high dissolved solids, in Kooser Run is also of concern. Kooser Run has historically had high nitrate concentrations, but the recent phosphate measurement is much higher than historic measurements. Historic reports relate the degraded conditions in Kooser Run to siltation impacts from Hidden Valley Ski Resort, an upstream limestone quarry, and to effluent from an upstream fish hatchery. These potential impacts are still of concern.

Laurel Hill Creek. Fourteen sites on the mainstem Laurel Hill Creek were assessed as part of this River Basin Conservation Plan. Water quality was found to be good or good to excellent at 9 of the 14 sites. *Upstream Section*: The 2 most upstream sites, located in the agricultural area of the watershed, had only fair water quality due to high concentrations of ammonia, nitrate, and phosphate. pH and dissolved oxygen were found to be adequate. Historic findings have documented poor water quality here, and have attributed that to increased siltation from cattle crossings in the stream. Nitrate concentrations have historically been high, although phosphorus concentrations have typically been normal. *Mid Section*: The water quality is currently characterized as good. pH measurements during the current survey were somewhat lower than those measured historically, but may reflect the method utilized by the one survey group compared to higher pH measurements made by the other survey group in the current survey. Dissolved oxygen measurements were very good, corroborating historic findings. Temperature has been adequate both historically and in the current survey. Nutrient concentrations were normal, except for a single nitrate measurement on Laurel Hill Creek near Kings Bridge. Nitrate concentrations historically have been somewhat high, which may indicate an improving situation in the middle reaches of Laurel Hill Creek. *Lower Section*: The current survey rated water quality from fair to good in the lower section of Laurel Hill Creek. Nitrate and phosphate concentrations were elevated somewhat, which might reflect nutrient inputs from Paddytown Hollow. Water temperature was elevated in sections of the stream with little canopy cover, but dissolved oxygen concentrations appeared to be adequate. These data corroborate historic findings that the stream in the lower section is wide, shallow and has little canopy cover. These characteristics result in elevated water temperatures in summer.

Sandy Run. Sandy Run has good water quality, based on the current survey. pH was somewhat low, however, and precluded it from receiving an excellent rating. Alkalinity and pH have historically been low as well, indicating a poor buffering capacity of the stream. The current pH values are somewhat higher than those made historically, although the second measurement made by Kleinschmidt in the current survey is more typical of those pH data collected historically.

Shaffer Run. Based on the current survey, Shaffer Run has good water quality. pH was found to be below neutral in the current survey (6.6). Comparison to historic records shows pH values typically higher than this. Further monitoring of Shaffer Run is warranted to determine if this is a trend. Alkalinity has historically been good, indicating an adequate buffering capacity of the stream. Concerns have been raised regarding water levels in Shaffer Run being negatively influenced by groundwater withdrawals from the Shaffer Run wells of the Borough of Somerset. Historic observations indicate that this concern is valid, and the data shown iu Graph WR-3 indicates that this negative impact may have a broader concern on baseflows in Laurel Hill Creek.

5.8 Watershed Issues aud Recommendations Related to Water Quality

Most of the anthropogenic (human-caused) water quality problems in the Laurel Hill Creek watershed are related to nutrients. The following issues have been identified and should be addressed to remediate nutrient and other water quality impacts:

- Implementation of agricultural best management practices (BMPs) needs to contiuue in the watershed. This is particularly important in the upper reaches along Laurel Hill Creek, and may be an issue in the Paddytown Hollow watershed as well. Stream fencing, natural riparian buffers, and manure containment systems are critical to nutrient reductions in these areas. BMP implementations will likely be required as part of the TMDL process for these impaired waters.

- The impact of nutrient inputs from the Scottyland WWTP on both Lost Creek and Laurel Hill Creek needs to be investigated. Nutrient concentrations in both Lost Creek and in Laurel Hill Creek downstream from the Lost Creek coufluence are elevated. Further investigation may determine that nutrient controls on the wastewater effluent are warranted.

- The influence of septic fields on baseflow water quality should be fnrther investigated. This may play a role in high nutrients as well, particularly in areas like Paddytown Hollow and perhaps Lost Creek. Other areas, such as the Whipkey Dam area along Laurel Hill Creek, should also be iuvestigated due to their residential nature.

- The high nutrients and high dissolved solids (indicated by the milky cloudiness of the water) in Kooser Run need to be investigated. It is possible that these conditions are related to upstream land uses, includiug quarrying activities. An analysis of metals in the streamflow is also warranted, given the milky appearance of the water. The cause for high nutrients in Kooser Run needs to be investigated.

- Low pH conditions in a number of streams, including Cole Run, Jones Mill Run, and Cranberry Glade Run, may be unrelated to human activities. Low pH in streams can be remediated through the incorporation of limestone treatments, including simply adding limestone boulders in an upstream section of the stream. Gross Run is another tributary with historic data showing some extremely low pH conditions (pH < 4.0).

- The high chloride and sodium concentrations in Clear Run need to be addressed. Spring runoff controls from the turnpike or runoff treatments need to be implemented to eliminate these water quality problems.

In addition to addressing water quality issues in the watershed, it is recommended that a flow-related sustainable water management study be completed. Several of the tributaries to the mainstem Laurel Hill Creek provide substantial flow. Water withdrawals in these tributaries, or from the mainstem Laurel Hill Creek, could have significant impacts on the sustainable ecological functioning of the stream. Median flows in Laurel Hill Creek, as measured as Ursina, are already quite low (46 cfs in September). In the upstream portion of the watershed, Clear Run, Shaffer Run, and Kooser Run provide significant dilution of the high nutrient waters of Laurel Hill Creek in that portion of the watershed. Surface and groundwater withdrawals from these tributaries can impact the water quality of Laurel Hill Creek, as well as the water quantity in summer months.

We strongly recommend that an ecological water needs study, such as the Ecologically Sustainable Water Management approach, be undertaken as soon as funding is available. It is possible that an ESWM study could find that current withdrawals are negatively impacting the stream, and that current water withdrawals, either surface water or groundwater, need to be curtailed or modified. An ESWM study needs to be completed to protect the stream and its tributaries so that the impact from future proposed surface water or groundwater withdrawals can be clearly understood.

6.0 Biological Resources

6.1 Stream Habitat Assessments

The quality of stream habitat in the Main Stem of Laurel Hill Creek and its tributaries was first reviewed by searching existing reports and studies. A limited amount of historical data and information pertaining to macroinvertebrates and trout populations was available. This historical information is summarized for each tributary on the bottom of each water quality table in Appendix A, more current and comprehensive data and information was gathered through the 2003 snapshot survey described earlier in this plan. Field data sheets were developed specifically for this project that allowed intern-level field personnel to gather habitat quality information.

The habitat assessment criteria that were gathered during the 2003 snapshot survey were:

- Average stream width and depth at a representative riffle
- Width to depth ratio for the representative riffle
- Average canopy cover in the reach
- Predominant surrounding land use
- Percent of the reach with aquatic vegetation
- Percent of the stream reach with a tree/shrub riparian zone
- Average width of tree/shrub riparian zone, if present
- Unvegetated areas on stream banks
- Visible bank erosion
- Percentage that gravel and/or cobble is surrounded by fine sediment (sand or silt)
- Presence of substrate odors or colors
- Percent substrate composition (bedrock, boulder, cobble, gravel, sand, etc.)

The results of these 2003 habitat assessments are presented in Appendix B. A summary of the habitat assessment characteristics for the 10 Main Stem Laurel Hill Creek sites is shown in Table BR-1.

Table BR-1. Habitat characteristics of Laurel Hill Creek at mainstem sampling stations, as measured during the summer 2003.

LAUREL HILL CREEK MAINSTEM STATIONS										
Habitat Characteristics	A-0 - East crossing at Duck Pond Road	A-3 - Jimtown Bridge	A-4 - Downstream of Laurel Hill State Park WWTP	A-4a - Downstream of Allen Creek Confluence	A-5 - Barronvale Bridge	A-5a - King's Bridge	A-6 - Bridge Below Whipkey Dam	A-7 - State Game Lands 111 Access	A-8 - Covered Bridge, Downstream of Paddytown Hollow Confluence	A-9 - Below Lower Humbert Covered Bridge
Average Stream Width (ft) at Representative Riffle:	25	60	80	80	100	80	112	50	60	100
Water Depth at Representative Riffle (ft):	0.7	2	1.5	1	1	2	1.5	1.5	1.3	1
Width to Depth Ratio at Representative Riffle:	35.7:1	30:1	53.3:1	80:1	100:1	40:1	74.7:1	33.3:1	46.2:1	100:1
Average Canopy Cover (%):	0	10	80	50	15	5	5	30	5	10
Predominant Land Use:	row crop ag.	field/pasture	forest	forest	forest	forest	forest	forest	forest	forest
Percentage of the Reach that has Aquatic Vegetation:	15	0	0	20	0	10	15	0	10	0
Percent of Stream Reach with a Tree/Shrub Riparian Zone:	10	100	100	100	100	100	90	100	100	100
Average Width of the Tree/Shrub Riparian Zone:	< 15	30 - 50	> 50	> 50	> 50	30 - 50	30 - 50	> 50	> 50	30 - 50
Unvegetated Stream Banks:	none	rare	none	none	none	none	rare	rare	none	rare
Bank Erosion Visible?	minor	moderate	none	none	minor	none	none	minor	minor	minor
Percentage that Gravel and/or Cobble is Surrounded by Fine Sediment (Sand or Silt):	0 - 25	> 75	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25
Odors or colors in Stream Substrate:	sewage	none	none	petroleum	none	none	none	none	some black on rocks	none
Percent Substrate Composition:										
Bedrock								20		
Boulder	30	10	20	30	20	30	15	30	10	20
Cobble	40	10	35	40	30	50	75	30	70	50
Gravel	10	10	35	20	30	15	5	10	15	20
Sand		35	10	10	20	5	5	10	2.5	10
Silt	20	35							2.5	
Overall Habitat Assessment	Fair	Fair-Poor	Excellent-Good	Good	Good	Good	Good	Good	Good	Good

Habitat Assessment Categories:

Excellent	Significant canopy, forest land use, significant riparian zone coverage, no bank erosion, no occurence of gravel and/or cobble surrounded by fine sediment, and high composition of cobble and gravel substrate
Good	Signicant canopy, primarily forest land use, > 50% riparian zone coverage, minimal bank erosion, low percentage of gravel and/or cobble surrounded by fine sediment, and a mix of the various substrates (cobble, gravel, boulder, with minimal fines)
Fair	Limited canopy cover, land use other than forest (such as agriculture), limited riparian zone coverage (< 50%), moderate bank erosion, moderate to high percentage of gravel and/or cobble surrounded by fine sediment, and mix of fines and other substrates (cobble, boulder, gravel)
Poor	No canopy, land use other than forest (such as agriculture), minimal to no riparian zone coverage, significant bank erosion, high percentage of gravel and/or cobble surrounded by fine sediment, and substrate consisting primarily of fines (sand, silt, and mud)

An overall habitat assessment categorization was made for each site based on the habitat characteristics listed above. Stream habitat assessments were "excellent" to "good" at eight of the ten sites assessed. A good habitat rating indicates:

- Significant canopy cover
- Primarily forest land use
- Greater than 50% riparian zone coverage
- Minimal bank erosion
- Low percentage of gravel and/or cobble surrounded by fine sediment
- Mix of various substrates (boulder, cobble, gravel, with minimal fine sediments such as sand and silt)

Only the two most upstream sites were assessed as "fair" or "fair to poor". These sites were Laurel Hill Creek at the east crossing of Duck Pond Road and Laurel Hill Creek at Jimtown Bridge. Both sites exhibited significant percentages of silts and sands as part of the stream substrate, with minor to moderate streambank erosion observed. Sewage odors were evident at the east Duck Pond Road site, while significant sediment embeddedness (gravel/cobble being surrounded by silts or sands) was observed at the Jimtown Bridge site. Canopy cover is also low at these two sites, and they are dominated by agricultural land uses.

The habitat quality of the Laurel Hill Creek tributaries appear to be in "excellent" to "good" condition at 11 of the 12 tributaries assessed (Table BR-2). Only Paddytown Hollow was rated lower, at "good to fair", primarily because the stream substrate had a silt component, the stream had a low canopy cover, and the substrate had a significant embeddedness component.

Table BR-2. Habitat characteristics of Laurel Hill Creek tributary streams, as measured during the summer 2003.

LAUREL HILL CREEK TRIBUTARY STATIONS

Habitat Characteristics	Allen Creek	Blue Hole Creek	Clear Run	Cole Run	Cranberry Glade Run	Jones Mill Run	Keeser Run	Lost Creek	Paddytown Hollow	Sandy Run	Shafer Run	Whipkey Run
Average Stream Width (ft) at Representative Riffle:	15	30	20	15	15	20	20	6	10	25	15	20
Water Depth at Representative Riffle (ft):	1	1	0.7	0.5	1	1.2	1	0.7	0.3	1.5	1.3	1.5
Width to Depth Ratio at Representative Riffle:	15:1	30:1	28.6:1	30:1	15:1	16.7:1	20:1	8.6:1	33.3:1	16.7:1	11.5:1	13.3:1
Average Canopy Cover (%):	90	90	50	90	50	90	90	90	50	95	90	90
Predominant Land Use:	forest	forest	forest	forest	forest	forest	forest	forest	forest	forest	forest	forest
Percentage of the Reach that has Aquatic Vegetation:	0	5	0	0	0	0	0	10	50	10	0	10
Percent of Stream Reach with a Tree/Shrub Riparian Zone:	85	100	95	100	50	100	100	100	80	100	100	100
Average Width of the Tree/Shrub Riparian Zone:	> 50	> 50	> 50	> 50	> 50	> 50	> 50	> 50	15 - 30	> 50	> 50	> 50
Unvegetated Stream Banks:	none	rare	none	none		rare	rare	none	rare	rare	rare	rare
Bank Erosion Visible?	none	none	none	none		none	none	moderate		none	none	none
Percentage that Gravel and/or Cobble is Surrounded by Fine Sediment (Sand or Silt):	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	25 - 50	0 - 25	0 - 25	0 - 25
Odors or colors in Stream Substrate:	none	none	none	none	none	none	none	none	none	none	none	none
Percent Substrate Composition:												
Bedrock									10			
Boulder	5	20	40	15	10	5	10	40	30	40	10	85
Cobble	45	30	10	50	40	80	50	30	30	50	70	10
Gravel	40	40	40	35	30	10	30	20	20	10	15	5
Sand	10	10	10		10	5	10	10			5	
Silt					10				10			
Overall Habitat Assessment:	Excellent	Excellent	Excellent-Good	Excellent	Good	Excellent	Excellent	Good	Good-Fair	Excellent-Good	Excellent-Good	Good

Habitat Assessment Categories:

Excellent Significant canopy, forest land use, significant riparian zone coverage, no bank erosion, no occurence of gravel and/or cobble surrounded by fine sediment, and high composition of cobble and gravel substrate

Good Signicant canopy, primarily forest land use, > 50% riparian zone coverage, minimal bank erosion, low percentage of gravel and/or cobble surrounded by fine sediment, and a mix of the various substrates (cobble, gravel, boulder, with minimal fines)

Fair Limited canopy cover, land use other than forest (such as agriculture), limited riparian zone coverage (< 50%), moderate bank erosion, moderate to high percentage of gravel and/or cobble surrounded by fine sediment, and mix of fines and other substrates (cobble, boulder, gravel)

Poor No canopy, land use other than forest (such as agriculture), minimal to no riparian zone coverage, significant bank erosion, high percentage of gravel and/or cobble surrounded by fine sediment, and substrate consisting primarily of fines (sand, silt, and mud)

6.2 Benthic Macroinvertebrate Assessments

Benthic macroinvertebrate sampling was performed as part of the 2003 snapshot surveys. Benthic macroinvertebrate samples were collected using a benthic kick seine method at sites where habitat assessments were performed. Two benthic macroinvertebrate assessment indices were utilized to assess the quality of the stream bottom habitat: a modified EPT index and a benthic sensitivity score. Both indices were simplified versions of existing methodologies, modified so that intern-level field personnel needed to only identify major taxa but would still yield useful, albeit general, assessment information. Details on the two indices can be found in Appendix B.

Since more detailed identification levels were not possible through this snapshot survey, these benthic data results provide limited insight relative to more robust benthic studies.

Identified organisms were classified into three different groups, sensitive (e.g., stoneflies), somewhat sensitive (e.g., crayfish), and tolerant (e.g., aquatic worms). Based on the relative abundance level of organisms within each group, an EPT test score [Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies)] and a sensitivity score were derived (details in Appendix B). Scores were categorized into "excellent", "good", "fair" or "poor", and benthic assessments were derived from the two scores.

All Main Stem Laurel Hill Creek sites were judged to have benthic assessments of either "good" or "excellent" (Table BR-3). Stoneflies, mayflies, and caddisflies were each collected at all main stem sites except the Jimtown Bridge site (stoneflies were not collected), the site downstream of the Allen Creek confluence (caddisflies were not collected), and the upstream site at the west Duck Pond Road crossing (only mayflies were collected).

Table BR-3. Summary of 2003 benthic macroinvertebrate sampling data for stations on the mainstem Laurel Hill Creek.

Laurel Hill Creek Sampling Station	*EPT Test Score*	*Sensitivity Score*	*Overall Benthic Assessment*
A.0 - East crossing at Duck Pond Road	Excellent	Good	Excellent-Good
West Crossing at Duck Pond Road	Excellent	Excellent	Excellent
A.3 - Jimtown Bridge	Excellent	Excellent	Excellent
A.4 - Downstream of Laurel HillState Park WWTP	Excellent	Excellent	Excellent
A.4a - Downstream of Allen Creek Confluence	Excellent	Fair	Good
A.5 - Barronvale Bridge	Excellent	Excellent	Excellent
A.5a - King's Bridge	Excellent	Excellent	Excellent
A.6 - Bridge below Whipkey Dam	Excellent	Excellent	Excellent
A.7 - State Game Lands 111 Access	Excellent	Excellent	Excellent
A.8 - Covered Bridge Downstream of Paddytown Hollow Confluence	Excellent	Excellent	Excellent
A.9 - Below Lower Humbert Covered Bridge	Excellent	Excellent	Excellent
See Appendix A for the benthic data and scoring sheets/information.			

Benthic assessments were conducted on 12 tributaries to Laurel Hill Creek. Benthic assessments were "excellent" to "excellent to good" at all tributaries except Clear Run, which had a "fair to poor" benthic assessment (Table BR-4). Only a single mayfly was collected at Clear Run. Since benthic habitat was "excellent to good" at this site, the absence of a healthy benthic community reflects the poor water quality at the site. Stoneflies and caddisflies were each collected at all tributaries except Clear Run. Mayflies were collected at all tributaries except Blue Hole Creek, Cole Run, Cranberry Glade Run, and Sandy Run. An abundance of stoneflies and caddisflies at these latter four sites indicates a healthy benthic community.

Table BR-4. Summary of 2003 benthic macroinvertebrate sampling data for stations on tributaries to Laurel Hill Creek.

Tributary Stream Sampling Station	*EPT Test Score*	*Sensitivity Score*	*Overall Benthic Assessment*
Allen Creek	Excellent	Excellent	Excellent
Blue Hole Creek	Excellent	Excellent	Excellent
Clear Run	Failed	Fair	Fair-Poor
Cole Run	Excellent	Good	Excellent-Good
Cranberry Glade Run	Excellent	Excellent	Excellent
Jones Mill Run	Excellent	Excellent	Excellent
Kooser Run	Excellent	Excellent	Excellent
Lost Creek-Upstream of Scottyland WWTP Outfall	Excellent	Excellent	Excellent
Paddytown Hollow	Excellent	Good	Excellent-Good
Sandy Run	Excellent	Excellent	Excellent
Shafer Run	Excellent	Excellent	Excellent
Whipkey Run	Excellent	Good	Excellent-Good
See Appendix A for the benthic data and scoring sheets/information.			

6.3 Overall Stream Health Assessment

The historic and snapshot survey data for habitat quality, water quality, and benthic health were utilized to develop an overall assessment of stream health. Appendix C contains "subwatershed summary sheets" for each tributary and the Main Stem of Laurel Hill Creek. These sheets include both historical and snapshot survey (2002 to 2003) information on water quality, benthic, and habitat conditions and other relevant information about each stream.

The overall stream health assessments are shown in Table BR-5. Most Main Stem Laurel Hill Creek sites are judged to have "good" to "excellent" stream health. However, the two most upstream Laurel Hill Creek sites (the crossing at Laurel Run Road and the east crossing at Duck Pond Road) are judged to have only "fair" stream health because of habitat quality and water quality issues. Further downstream, the Jimtown Bridge site on Laurel Hill Creek is judged to have "good to fair", stream health because of habitat quality concerns. The Ursina bridge site on Laurel Hill Creek is judged to have "fair" stream health because of water quality concerns; however, habitat quality and benthic health were not assessed at the Ursina site.

Twenty-five stream health assessments were made for tributaries to Laurel Hill Creek, using historic and current (snapshot) data if available (Table BR-5). The nine tributaries with "excellent", "excellent to good", or "good" stream health were Allen Creek, Blue Hole Creek, Crab Run (near Allenvale), Cranberry Glade Run (downstream segment), Jones Mill Run, Lost Creek (upstream of the Scottyland outfall), Sandy Run, Shaffer Run, and Whipkey Run.

Seven sites were judged to have "good to fair", "fair", or "poor" stream health using current data. Clear Run was judged to have "fair" stream health, primarily because of water quality (sodium and chloride concentrations) and benthic health concerns. Cole Run was judged to have "good to fair" stream health because of low pH concerns. Cranberry Glade Run, downstream of Cranberry Glade Lake, was judged to have "poor" stream health because of low pH and nutrient concerns. Lost Creek at the Scottyland WWTP outfall and downstream of the outfall were judged to have "poor" stream health because of nutrient concerns, and Lost Creek downstream of the Scottyland WWTP outfall was judged to have "good to fair" stream health because of the same nutrient concerns. Kooser Run was judged to have "good to fair" stream health because of high nitrate and dissolved solids coucentrations. Paddytown Hollow was judged to have "fair" stream health because of habitat quality and nutrient concerns.

Nine other streams were judged to have "good to fair", "fair" or "poor" stream health using historic data only. These streams included Ansell Run, Buck Run, Cranberry Glade Lake, Crise Run, Fall Creek, Gross Run, Harbaugh Run, May Run, and Spruce Run. Appendix A provides synopses of historic data for each tributary, including the sampling years and references for the historic data sources. There were eleven streams or lakes for which no data were collected or found.

6.4 Historic and 2003 Snapshot Stream Health Comparisons

Stream health assessments from historic surveys are compared to results from the current snapshot survey for streams that have both current and historic data for comparison. The data are generally not adequate for statistical trend analyses, as sampling sites, methods, and times of year vary considerably between surveys on the same stream. However, a qualitative review of historic data in general was made and compared to the findings of the current snapshot survey. Differences between historic and current assessments are noted below. These differences point to potential areas of concern or improvement in stream conditions, and warrant further action in terms of increased monitoring, impact assessments, or restoration actions.

Allen Creek. The current stream health assessment for Allen Creek is excellent (Table 5.7). Both habitat and macroinvertebrate assessments resulted in excellent ratings. While this is contrary to historic findings, those surveys were conducted immediately downstream of the Seven Springs sewage treatment plant, while the current assessment was conducted near the mouth with Laurel Hill Creek. Since recent sampling has not been conducted immediately downstream from the STP, it is not known if conditions have improved from those historically documented.

Blue Hole Creek. Blue Hole Creek is rated as excellent for both habitat and macroinvertebrates (Table 5.7). Similar findings were made historically, including the same assessment of poor buffering capacity. Based on

macroinvertebrate surveys, conditions have improved from about 30 years ago, when only acid-tolerant species were collected.

Clear Run. The current stream health of Clear Run is rated only as fair, based in large part on the poor macroinvertebrate community findings and the high chlorides found in the water quality survey. These results are similar to historic findings of low invertebrate density, low alkalinity, and high conductivity.

Cole Run. The current stream health of Cole Run is rated as good to fair, based largely on the poor water quality assessment. Macroinvertebrates were rated as good to excellent, which appears to be an improvement over historic findings. Historic surveys have found no fish in Cole Run, presumably due to the very low pH conditions.

Cranberry Glade Run. The stream health of the downstream segment of Cranberry Glade Run is rated as good to excellent based on current survey results. The upstream segment of the stream was not assessed for habitat or macroinvertebrates, but the water quality in that segment of the stream is poor. Historic measurements of alkalinity have shown low concentrations, with marginal fish population data results. No historic macroinvertebrate data were found for comparison purposes.

Jones Mill Run. The stream health of Jones Mill Run is currently rated as good to excellent, with habitat and macroinvertebrate assessments rated as excellent. As stated previously, the low pH and historically high nitrates need to be further monitored to better understand if these parameters are of concern. Jones Mill Run has historically had a high density of macroinvertebrates and a reproducing trout population. Conditions appear to continue to be excellent, with the possible exception of pH and nitrates.

Kooser Run. The stream health of Kooser Run is currently rated as good to fair, based on the good to fair water quality rating discussed previously. Habitat and macroinvertebrate assessments were both excellent for Kooser Run. Historic surveys for macroinvertebrates have found moderately high densities, with adequate habitat for trout but shallow depths for adequate growth. The current habitat and macroinvertebrate assessments compare favorably

with historic findings, as does the fair water quality documented both historically and under current conditions. Further investigation is necessary.

Laurel Hill Creek. *Upstream Section*: The 2 most upstream sites, located in the agricultural area of the watershed, are rated as only fair for stream health. This low rating is based on water quality and habitat characteristics. Riffles for macroinvertebrate habitat are rare in this section, and siltation is common in the dominant pool habitats. The reduced occurrence of riparian buffers and stream fencing are important factors in causing this siltation, and need to be addressed. These findings are similar to those made historically. *Mid Section*: Stream health in the mid section of Laurel Hill Creek was generally good, with good to excellent macroinvertebrate diversity. These findings are also similar to those made historically. *Lower Section*: Stream health is rated as fair to good here, with water quality concerns related to elevated nutrients, wide and shallow stream habitat, lack of canopy cover, and resulting elevated water temperatures. These findings are similar to those made historically, with the exception that nutrients seem to be more of a concern now than historically.

Sandy Run. Stream health for Sandy Run is currently rated as good to excellent. Macro-invertebrate survey results from the current survey are rated as excellent, which may be an improvement from historic findings. pH and buffering capacity continue to be limiting factors to the stream health of Sandy Run.

Shaffer Run. Shaffer Run is rated as having good to excellent stream health, based on the current survey. Low pH and historic water level concerns are the primary issues for Shaffer Run. A high nitrate concentration was noted historically, although this was not observed in the current survey. Further monitoring for pH, water level and stream flow, and general water quality are warranted for Shaffer Run.

6.5 Species of Special Concern Within the Watershed

The Laurel Hill Creek Watershed is known to have several species of plants and animals that reside or are expected to reside within its boundary that are listed as species of concern. Table BR-6 lists the common and scientific name, type of species, and current and proposed status of these species. The species of concern within the watershed include seven species of plants and 11 species of animals. These lists of species of concern were based on input from the Pennsylvania Fish and Boat Commission, the Pennsylvania Game Commission, the Pennsylvania Natural Areas Inventory, and the U.S. Fish and Wildlife Service. Future proposed changes to the watershed that could potentially affect habitat in the watershed should consider possible impacts to these species and their habitats.

Table BR-6. Species of special concern in the Laurel Hill Creek watershed.

Scientific Name	Common Name	Type of Species	Current Status	Proposed Status
Flora:				
Luzula bulbosa	southern wood-rush	herbaceous plant	undetermined	PA endangered
Najas gracillima	bushy naiad	aquatic plant	PA threatened	PA threatened
Platanthera peramoena	purple-fringeless orchid	herbaceous plant	undetermined	PA threatened
Viola appalachiensis	Appalachian blue violet	herbaceous plant	PA threatened	undetermined
Cimicifuga americana	American bugbane	herbaceous plant	PA threatened	PA rare
Pyrulaira pubera	buffalo-nut	shrub	PA rare	PA rare
Trautvetteria caroliniensis	carolina tassel-rue	herbaceous plant	PA rare	PA rare
Fauna:				
Myotis sodalis	Indiana bat	bat	Federally endangered	Federally endangered
Myotis septentrionalis	Northern Myotis bat	bat	PA species of concern	PA species of concern
Myotis leibii	Small-footed Myotis bat	bat	PA threatened	PA threatened
Neotoma magister	Eastern woodrat		PA threatened	PA threatened
Sorex palustris albibarbis	Northern water shrew	shrew	PA threatened	PA threatened
Sorex palustris punctulaus	West Virginia water shrew	shrew	PA species of concern	PA species of concern
Lutra Canadensis	Northern river otter	otter	PA at risk species	PA at risk species
Crotalus horridus	Timber rattlesnake	snake	PA candidate	PA candidate
Pandion haliaetus	Osprey	bird	PA threatened	PA threatened
Haliaeetus leucocephalus	Bald Eagle	bird	PA endangered	PA endangered
Bartramia longicuada	Upper sandpiper	bird	PA threatened	PA threatened

6.6 Biodiversity Considerations

The Pennsylvania Natural Heritage Program at The Western Pennsylvania Conservancy has identified five areas in the Laurel Hill Creek Watershed that are classified as Biological Diversity Areas (BDAs). These designations are largely based on the presence of endangered, threatened, or species of special concern. These five BDAs are:

- The State Game Lands No. 111 shrub swamp area (in the Confluence and Kingwood USGS topographic quadrangles). This area is a good example of palustrine shrub swamp wetlands, and provides habitat for Oxypolis rigidior, a plant species of special concern.
- Laurel Hill Creek (length of the watershed). Designation based on both stream and riparian habitat and vegetation communities.
- Cranberry Glade Lake (Mill Run and Kingwood quadrangles). This designation includes the lake and a 100 meter buffer around the lake. The osprey and a dragonfly species of special concern inhabit this area.
- The Kings and Barronvale covered bridges areas (Kingwood quadrangle). The riparian habitat in these areas is home to Viola appalachiensis (Appalachian blue violet) and Platanthera peramoena (purple fringeless orchid). The violet is a threatened species in Pennsylvania, and the orchid has a proposed threatened status in Pennsylvania.
- Laurel Hill State Park and Jones Mill Run (Rockwood, Bakersville, and Seven Springs quadrangles). Cimicifuga americana (American bugbane), a threatened plant species in

Pennsylvania, inhabits this area, as do Viola appalachiensis (Appalachian blue violet) and Platanthera peramoena (purple fringeless orchid).

- Blue Hole Creek/Forbes State Forest. High quality stream habitat is present in Blue Hole Creek, as well as diverse riparian and upland plant communities.

The geographic range of these five BDAs spans nearly the entire length of the Laurel Hill Creek Watershed. This in itself demonstrates the high natural resource diversity and value of the watershed. Conservation efforts are encouraged in the watershed to protect these areas and others in the watershed. These efforts should be aimed toward providing buffers around key areas, reducing habitat fragmentation by future development, promoting management plans that protect species of concern and their habitats, and promoting conservation and protection practices on private lands.

6.7 Exotic and Invasive Species Management

No data on exotic or invasive species were found that were specific to either the Laurel Hill Creek Watershed or to Somerset County. The DCNR, however, has lists of invasive plants for each of six regions of Pennsylvania that are considered either moderate or severe threats to native plant communities. These species lists are included in Appendix D.

Several invasive species from these lists in Appendix D are noteworthy. Species that are serious threats and are also frequently found in the Southwest Region of Pennsylvania include:

- Garlic mustard (Alliaria petiolata)
- Musk thistle (Carduus nutaus)
- Canadian thistle (Cirsium arvense)
- Bull thistle (Cirsium vulgare)
- Jimsonweed (Datura stramonium)
- Morrow's honeysuckle (Lonicera morrowii)
- Tartarian honeysuckle (Lonicera tartarica)
- Multiflora rose (Rosa multiflora)
- Oriental bittersweet (Celastrus orbiculatus)

Other plant species that are occasionally found in the Southwest Region but still considered serious threats include: purple loosestrife (Lythrum salicaria and L. virgatum), common reed (Phragmites australis), Japanese knotweed (Polygonum cuspidatum), Johnson grass (Sorghum halepense), Norway maple (Acer platanoides), tree-of-heaven (Ailanthus altissima), and Japanese honeysuckle (Lonicera japonica).

Species frequently found in the Southwest Region and considered moderate threats to native plant communities include: dame's rocket (Hesperis matronalis), star of Bethlehem (Ornithogallum nutans and O. umbellatum), wild parsnip (Pastinaca sativa), and reed canary grass (Phalaris arundinacea).

Management plans that are developed for areas in the Laurel Hill Creek Watershed should include approaches to control these exotic and invasive species. Surveys should be conducted in management areas for both native plant species of special concern and for exotic and invasive species. The presence of either should be guiding elements of the management plan being developed. Private landowners should be made aware of these exotic and invasive species through public outreach efforts, with recommendations provided to private landowners on control and elimination methods.

6.8 Watershed Issues and Recommendations Related to Biological Resources

The stream health assessments, combining habitat quality, benthic health, and water quality information corroborated the issues and recommendations discussed earlier in the "Watershed Issues and Recommendations Related to Water Quality" section under Water Resources. Those recommendations are summarized below with additional findings from the stream health assessments, and are presented in prioritized order beginning with the most urgent:

- An Ecologically Sustainable Water Management (ESWM) study needs to be conducted as soon as funding is available. An ESWM study needs to be completed to protect the stream and its tributaries so that the impact from current and future proposed surface water or groundwater withdrawals can be clearly understood.

- Implementation of agricultural best management practices (BMPs) needs to continue in the watershed to address nutrient and sediment issues in the upper reaches along Laurel Hill Creek, and in the Paddytown Hollow watershed as well. Stream fencing, natural riparian buffers, and manure containment systems are critical to nutrient and sediment reductions in these areas.

- High chloride and sodium concentrations in Clear Run need to be addressed. Spring runoff controls from the turnpike or runoff treatments need to be implemented to eliminate these water quality problems. This runoff is affecting the benthic communities in Clear Run.

- The high nutrients and high dissolved solids in Kooser Run (indicated by the milky cloudiness of the water) in Kooser Run needs to be investigated.

- The impact of nutrient inputs from the Scottyland WWTP on both Lost Creek and Laurel Hill Creek needs to be investigated.

- The influence of septic fields on baseflow water quality should be further investigated in the Paddytown Hollow and Lost Creek watersheds. Other areas, such as the Whipkey Dam area along Laurel Hill Creek, should also be investigated due to their residential nature.

- Sediment impacts on Laurel Hill Creek at Jimtown Bridge should be further investigated to determine if a land use practice may be contributing to substrate embeddedness at this site.

- The cause and persistence of high nutrient concentrations in Cranberry Glade Run below Cranberry Glade Lake needs to be further investigated to determine if it is a problem that needs to be addressed.

- Low pH in streams can be remediated through the incorporation of limestone treatments, including simply adding limestone boulders in the upstream sections of streams including Cole Run, Jones Mill Run, and possibly Cranberry Glade Run. The feasibility of pH remediation for these streams needs to be investigated.

- The cause and persistence of high nutrient concentrations and high pH at the Ursina site on Laurel Hill Creek needs to be further investigated to determine if it is a problem that needs to be addressed.

- The feasibility of improving stream habitat in the lower reaches of Laurel Hill Creek needs to be investigated. The stream channel is wide and shallow here, with little canopy cover. Instream habitat improvements may be feasible to provide deeper and narrower riffle and run habitats.

7.0 Conclusions and Recommendations

This chapter presents the conclusions reached by the Steering Committee, stakeholder groups, and participating members of the general public involved in the preparation of this River Conservation Plan. These conclusions are based on an evaluation of the data and information collected that describe the current conditions in the Laurel Hill Creek Watershed and threats to the watershed. In addition, this chapter offers recommendations for future studies and initiatives for management of the watershed to protect and in some cases restore the exceptional quality of natural resources within the Laurel Hill Creek Watershed. The recommendations outline a master plan for the long-term management of the Laurel Hill Creek Watershed. These conclusions and recommendations are generally categorized as follows:

1. Public Education and Outreach

2. Further Watershed Evaluations and Studies

3. Institutional Controls for Watershed

4. Restoration Projects

7.1 Public Education and Outreach

Conclusion:

No membership-based group is proactively engaged in pursing available grant funding or partnering with other organizations to complete enhancement or conservation projects in the Laurel Hill Creek Watershed.

Recommendations:

A. Pursue funding from public and private sources to provide resources to support a stewardship organization, resources to support mobilization of existing organizations or set up new organizations focused on the Laurel Hill Creek Watershed, and to increase public awareness.

B. Partner with established organizations with common goals. Partners with common interests, typically will involve groups such as Somerset County Conservation District, Southern Alleghenies Conservancy, Casselman River Watershed Association, Township Supervisors, Somerset County Sportsmen's League, and other interested organizations.

C. Develop mechanisms to inform the public of watershed-related activities. Mechanisms to include Newsletters, River Sweep Events, etc.

D. Solicit established community service groups for support on projects. Service groups such as public schools, Boy Scouts, sportsman and fishing clubs, student groups, 4-H Clubs, etc.

E. Develop and maintain a watershed website as a long-term, publicly-available repository of watershed data. Website best-deployed to involve 1) GIS developed in conjunction with River Conservation Plan with updates as additional data become available, 2) integrated databases for historical and future water quality data, and 3) electronic copies of key documentation for the watershed.

Conclusion:

The public is not appropriately informed of issues which affect the character and quality of the watershed.

Recommendations:

A. Publicize the River Conservation Planning process through completion of the plan.

B. Pursue the installation of signage demarking the watershed.

C. Develop landowners guide or other documents defining stewardship specific to the Laurel Hill Creek Watershed. Then interact with public regarding documents. Documents to identify watershed-specific issues and recommended practices (e.g., Kettle Creek guide as prototype). Guide to address agricultural practices, timbering practices, ATV usage, litter control, on-lot sewage practices, etc. Documents should include listings of potential funding assistance sources and contact persons. Documents should be widely available to landowner associations, Grange, 4-H Groups, sportsmen, and others.

7.2 Further Watershed Evaluations and Studies and Relationship to Pennsylvania Act 220

Conclusion:

The River Conservation Plan process provides a baseline evaluation of the watershed. Ongoing and additional evaluations and demonstration projects are required to fill data gaps relating to water quantity and quality issues and to effectively manage the watershed.

A complete hydrologic analysis, encompassing both surface and ground water inputs and withdrawals, is necessary to further address this pressing issue of low stream flows during late summer and early fall. Development of this river conservation plan was timely with respect to initiation of statewide water resources planning under Pennsylvania Act 220 of 2002. Act 220 – The Water Resources Planning Act – requires the Pennsylvania Department of Environmental Protection (PADEP) to update the 25-year old State Water Plan and identify Critical Water Planning Areas. Act 220 defines a Critical Water Planning Area as "an area comprising any significant hydrologic unit where existing or future demands exceed or threaten to exceed the safe yield of available water resources". The Critical Water Planning Area Subcommittee developed draft criteria for designation of Critical Water Planning Areas in January 2005. The Laurel Hill Creek Watershed stakeholders strongly recommend that the PADEP and DCNR select the Laurel Hill Creek Watershed as the first watershed in Pennsylvania to be evaluated as a potential Critical Water Use Area and provide funding for the necessary studies.

Recommendations:

A. Conduct a complete hydrologic analysis, encompassing both surface water and groundwater inputs and withdrawals to further address the pressing issue of low stream flows during the summer and early fall and to evaluate whether Laurel Hill Creek meets PADEP criteria as a Critical Water Planning Area.

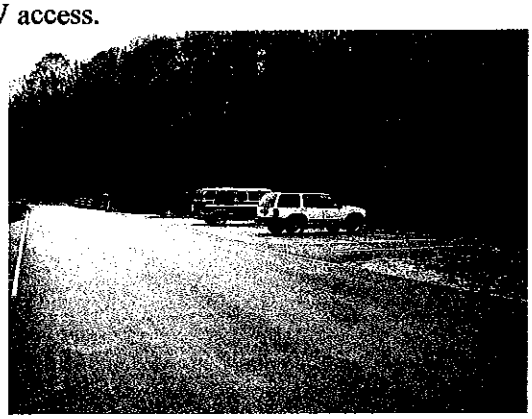
B. Complete a water needs assessment to consider the ecological needs for water in the stream and adjacent wetlands, and balances those ecological needs with surface and groundwater withdrawals for consumptive uses.

C. Establish volunteer monitoring program for long-term data collection. Initial permanent monitoring locations to monitor 1) effects of Turnpike and agricultural use in headwaters, 2) effects of Somerset Borough water withdrawals, 3) effects of resort/residential/quarry development in Kooser Run subwatershed, 4) effects of state park sewage treatment plant and resort/residential development in Allen Creek subwatershed, and 5) adverse low flow conditions in lower watershed below Whipkey Dam.

D. Establish biodiversity monitoring program. Effort should be coordinated with the Western Pennsylvania Conservancy, Nature Conservancy, or other party involved in the statewide biodiversity effort and the ongoing Somerset County Study. Program should include benthic surveys, mollusk surveys, and aquatic biodiversity assessment of the watershed.

E. Establish instream flow needs for trout in key subwatersheds. Instream Flow Incremental Methodology (IFIM) or similar methodology should be utilized in coordination with the PFBC. Needs are particularly important regarding existing or future withdrawals by Somerset Borough or other future water supply withdrawals.

F. Implement stormwater BMPs at existing access points to Laurel Hill Creek. Develop a plan addressing existing uncontrolled ATV access.



G. Complete detailed survey of the impact of recreational use of the watershed. Detailed survey to support future projects, including aspects related to public awareness and grant application processes. Study to integrate and expand on existing 1990's study by Penn State University.

H. Design and permit Model Rehabilitation Project for instream channels and streambanks. Model project to be a site on the Main Stem of Laurel Hill Creek. Model project to be initial phase for Laurel Hill Creek and to establish standard assessment protocols, design standards, and construction procedures to allow for efficient design/permitting for future phases. Project to consider historical projects in Humbert area by Boy Scouts. Project to address long-term maintenance issues including aspects related to impacts from ice flows.

I. Complete Model Riparian Buffer Project for agricultural area of watershed. Model project to be a site on the Main Stem of Laurel Hill Creek. Project to be prototype for provision of vegetated buffer to protect water resources. Project to involve plantings, barriers to livestock entry, and integration to existing farm and soil conservation programs. Project to establish standard assessment protocols, design standards, and construction procedures to allow for efficient implementation of future projects.

J. Complete evaluation of impacts of existing impoundments and lakes in watershed on water quality. Evaluation to include consideration of thermal affects. Evaluation to integrate protocols/standards of existing DCNR program on topic and consider integration with Technical Assistance Grant (TAG) Program.

K. Complete focused environmental assessments for specific-areas-of-concern as identified in the River Conservation Plan. Areas should include:

1. Upper reaches of the Main Stem of Laurel Hill Creek (to achieve nutrient abatement through agricultural BMP implementation and post-implementation monitoring).

2. Lower reaches of the Main Stem of Laurel Hill Creek (to address high nutrients, high pH, and habitat improvement needs – the stream channel is wide and shallow at this location, with low canopy cover and higher water temperatures).

3. Clear Run (the control of Pennsylvania Turnpike runoff is needed during late winter and spring to reduce the impacts of snow and ice chemical controls).

4. Cranberry Glade Run (need to investigate the nature of the low pH and high nutrients just below the lake to determine if they occur naturally or represent controllable pollution).

5. Lost Creek (need to investigate the potential impacts of high nutrient wastewater effluent entering Lost Creek to determine whether the nutrients affect Lost Creek and/or the Main Stem of Laurel Hill Creek).

6. Kooser Run (to achieve nutrient abatement; an analysis of metals in Kooser Run is needed to investigate the milky coloration of the water).

7. Paddytown Hollow (to achieve nutrient abatement).

8. Investigate water quality impacts from past mining activities including the mine waste piles in the areas of May Run and Paddytown Hollow. One mine waste pile, located on state game lands, is approximately 10 to 15 acres and could affect water quality in May Run.

L. A white aluminum precipitate has been observed in streambeds at various locations in the watershed. The sources of this precipitate should be investigated and remediated.

M. A study should be performed to evaluate the impact of acid rain on the Laurel Hill Creek Watershed.

7.3 Institutional Controls for Watershed

Conclusion:

Common institutional controls which affect watershed conservation are not robustly in place for the Laurel Hill Creek Watershed.

Recommendations:

A. Establish Township Building Permit processes or County Land Development Ordinance (or other municipal code or procedure) to reqnire prior written indication of compliance with PADEP requirements. Compliance with PADEP requirements expected to be primary measure to continne the conservation of the watershed. Compliance to address aspects related to 1) compliance with PADEP requirements under Pennsylvania Code, Title 25, Chapter 102 including aspects related to preparation of written Erosion and Sedimentation Control Plans and National Pollutant Discharge Elimination System (NDPES) permitting for control of stormwater during construction, and 2) compliance with requirements nnder Pennsylvania Code, Title 25, Chapter 105 including aspects related to wetlands and waterways obstructions and encroachments. The new BOCA Code requirements for municipalities is a near-term activity that could logically include suggested measures for watershed protection.

B. Pursue establishment of continuous, protected riparian corridor. Conservation zones to protect riparian vegetation and habitat should be legally established as much as possible. Zoning-type matters are generally difficult to implement. Initial focused effort on state-owned lands including state parks, state game lands, and state forest is appropriate to establish momentum to eventually address private property owners.

C. Pursue re-classification of Designated Use for segments of streams in watershed. Watershed largely has designated use of HQ-CWF with some segments EV. Candidate segments for EV should be monitored as part of a long-term monitoring plan. Designated Use affects procedures/evaluations required for PADEP permitting processes. Based upon data collected to date, the following segments are apparent candidates for upgraded Designated Use: Sandy Run, Main Stem of Laurel Hill Creek through State Gamelands No. 111, and Main Stem of Laurel Hill Creek in Laurel Hill State Park upstream of the park lake."

D. Pursue completion of Act 167 Stormwater Management Plan for the Laurel Hill Creek Watershed. Somerset County would be responsible for completion of the plan. Adoption of the plan would require each local municipality to enact ordinances under state law. Such ordinances to modern standards would be protective of the watershed. State grant funding is typically available to cover 75% of the cost of an Act 167 Plan.

E. Establish instream flow requirements for trout in key subwatersheds with regulators. Data from Instream Flow Incremental Methodology (IFIM) study identified previously. Study will facilitate robust review of existing or proposed withdrawals by water suppliers, including Somerset Borough.

F. Establish improved coordination with PFBC regarding activities in watershed. Coordination should Include aspects related to permitting processes for proposed land development, mining, and water supply withdrawals.

G. Pursue classification of areas for "unsuitable for mining" to PADEP criteria. Candidate areas include the entire watershed due to the occurrence of the Pottsville formation throughout the watershed.

H. Pursue listing Laurel Hill Creek as a "Wild and Scenic River". Effort to involve demonstration of criteria established by federal guidelines.

I. Pursue development of updated Act 537 Plans for all areas in the watershed. Effort to involve systematic sewage planning for existing and future development to current PADEP guidelines. PADEP grants are typically available to develop or update Act 537 Plans.

J. Pursue increased funding through the existing Farm Preservation Program. Enrollment of potential preservation areas is currently limited by funding rather than available candidate sites.

7.4 Restoration Projects

Conclusion:

Various specific site locations within the watershed have been identified as candidates for rehabilitation projects.

Recommendations:

A. Regular sweeps of Laurel Hill Creek to collect litter and high-water debris. Sweeps might be completed in conjunction with community service groups in coordination with public education and outreach efforts. The sweeps should include roadways, access points, parking areas, and historic sites along the creek corridor and could help elevate interest and participation in the overall conservation of the watershed.

B. Upgrade residential sewage systems at several moderate to high density locations to current design standards. Malfunctioning or non-existent systems suspected of contributing nutrient loading and unhealthy conditions at the following locations: Ursina, Whipkey Dam area, Triple Creek Acres area, Barronvale Bridge area, and Bakersville area.

C. Instream channel enhancement to create low flow habitat conducive to coldwater species for locations below Whipkey Dam. The existing broad channel in the area results in high-water temperatures during the typical low-flow season. Required channel enhancement is extensive and most practically implemented via model project with subsequent phase (refer to Item 7.2.F).

D. Non-engineered stream access at various locations should be upgraded to include stormwater BMPs to reduce soil and streambank erosion. Locations to be addressed should include: Eberly Scout Reservation area, various ATV crossing locations, Kings Covered Bridge area, Whipkey Dam area including parallel Creek Road, State Gamelands No. 111 area, and Humbert Covered Bridge area. Refer to Item 7.2.F.

E. Provide Vegetated Riparian Buffer at various locations within the upper reaches of the watershed upgradient of SR031. Lack of buffer affecting sediment and nutrient loading to Laurel Hill Creek principally for parcels in agricultural use. Specific locations currently lacking adequate riparian buffer include various private parcels in Jefferson Township.

F. Provide an engineered system to control runoff from the Pennsylvania Turnpike which is affecting the character and quality of Laurel Hill Creek. Further study is required but expected to conclude stormwater detention and infiltration to pre-development standards is appropriate. System to also address potential for spill of hazardous materials transported over the Turnpike.

G. Maintenance of gravel and unpaved roads in the watershed to current standards. Many miles of unpaved and gravel roads are present in the watershed. Implementation of current standards would reduce impacts from the roads. Effort should be coordinated with the Gravel Road Program and the Somerset County Conservation District. Existing roads and priorities for improvement as follows: Creek Road, McGuire Road, and roads in State Gamelands No. 111.

H. Provide an alternate source of water supply for Somerset Borough. Alternate source of supply particularly required during low-flow season. Withdrawals by the Borough during the low flow season reduce the amount of cold water habitat in Laurel Hill Creek.

I. Provide headwater water quality improvement projects. Projects should consider alkalinity improvement, heat sinks, and buffering projects. Projects to consider recent demonstration projects for other watersheds as completed under Growing Greener and other programs.

J. Complete restoration projects for specific-areas-of-concern based upon results of future focused environmental assessments Refer to Item 7.2.K for potential locations.

7.5 Enhancement Projects

Conclusion:

Various specific site locations within the watershed have been identified as candidates for enhancement projects.

Recommendations:

A. Implement stormwater BMPs at existing public access points to Laurel Hill Creek. Engineered access points would reduce potential impacts of access to the stream by recreational users. Any future facilities should be completed in accordance with a Master Plan. Refer to Items 7.4.D. and 7.2.D.

B. Provide instream channel enhancement to improve coldwater habitat. Enhancements to generally increase riffle areas and reduce potential for sedimentation. Areas to be established by area-specific evaluations but expected to include the following locations: Main Stem of Laurel Hill Creek from Gamelands No. 111 to Confluence and Whipkey Dam area. Refer to Item 7.2.H.

C. Install bottom, cold-water release structures for all lakes in the watershed. Low-level releases costly but would positively affect cold water habitats, particularly during the low flow season.

D. Identification and documentation of cultural and historic resources. Potential for development of recreational facilities in association with documented resources. Documentation currently limited but resources potentially include: Grist Mill at Whipkey Dam, CCC Camps, Humbert Mill, Shay Locomotive, covered bridges, and structures catalogued by the Somerset County Historical Society.

E. Pursue funding authorization for Proposed Visitors Center at Laurel Hill State Park. Project is approved by the State Legislature but funding is currently not authorized.

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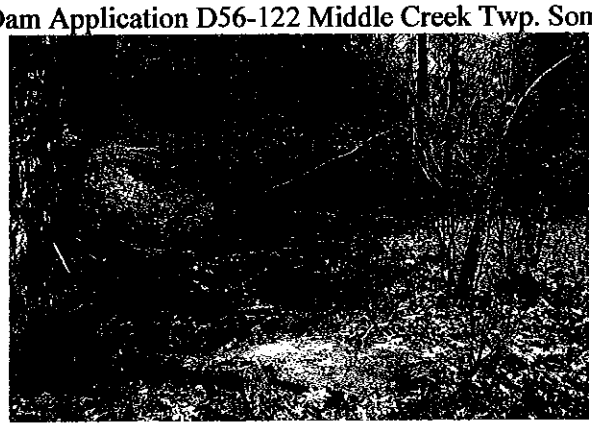


Tables

Table WR-1. Stream Lengths and Subwatershed Areas

Stream	Watershed Area (acres)	Surface Water Area (acres)	Stream Length (miles)
Allen Creek	2,911.6	8.6	5.0
Ansell Run	322.6	N.M.	1.0
Blue Hole Creek	2,098.5	1.6	4.8
Buck Run	701.6	N.M.	1.2
Clear Run	2,839.3	4.0	4.9
Coke Oven Hollow	1,058.7	N.M.	3.0
Cole Run	828.6	N.M.	2.4
Crab Run	2,654.4	N.M.	2.9
Crab Run II (East of Allen Run)	382.8	0.8	1.8
Cranberry Glade Run	3,190.1	95.4	12.2
Crise Run	624.0	N.M.	2.0
Fall Creek	3,505.2	1.6	5.2
Garys Run	781.1	N.M.	2.7
Green King Run	1,095.5	N.M.	2.1
Gross Run	746.3	N.M.	2.4
Harbaugh Run	1,631.6	7.7	2.7
Jones Mill Run	3,120.5	3.7	5.9
Keller Run	625.8	N.M.	2.0
Kooser Run	2,940.2	17.1	5.0
Laurel Hill Creek (Main Stem)	24,013.0	330.0	37.6
Lost Creek	2,686.5	30.3	4.6
May Run	721.6	0.7	1.6
Moore Run	430.0	N.M.	1.3
Mose King Run	1,514.8	1.7	3.3
Paddytown Hollow	1,881.2	0.8	4.1
Sandy Run	4,858.4	14.7	7.1
Shafer Run	2,678.2	N.M.	4.9
Shanks Run	577.6	5.3	1.5
Showman Run	412.5	N.M.	1.2
Smith Hollow	2,514.1	N.M.	4.0
Spruce Run	1,390.2	4.0	3.2
Whipkey Run	536.2	N.M.	1.6
Total	76,272.5		145.2

Table WR-2. Flow charateristics of Laurel Hill Creek watershed streams as measured during the summer of 2003.

Stream	Date	Flow (cfs)	Percent of flow at Ursina on that date
Allen Creek	06/10/03	25.5	5.4%
Ansell Run	---------- flow not measured ----------		
Blue Hole Creek	06/10/03	63.6	13.5%
Buck Run	---------- flow not measured ----------		
Clear Run	06/09/03	28.2	4.2%
Coke Oven Hollow	---------- flow not measured ----------		
Cole Run	06/10/03	4.3	0.9%
Crab Run	---------- flow not measured ----------		
Crab Run II (East of Allen Run)	---------- flow not measured ----------		
Cranberry Glade Run	---------- flow not measured ----------		
Crise Run	---------- flow not measured ----------		
Fall Creek	---------- flow not measured ----------		
Garys Run	---------- flow not measured ----------		
Green King Run	---------- flow not measured ----------		
Gross Run	---------- flow not measured ----------		
Harbaugh Run	---------- flow not measured ----------		
Jones Mill Run	06/09/03	33.0	4.9%
Keller Run	---------- flow not measured ----------		
Kooser Run	06/09/03	24.5	3.7%
Laurel Hill Creek at A0	06/24/03	8.9	4.6%
Laurel Hill Creek at A2	---------- flow not measured ----------		
Laurel Hill Creek at A3	06/23/03	96.1	40.4%
Laurel Hill Creek at A4	---------- flow not measured ----------		
Laurel Hill Creek at A4a	06/24/03	135.0	70.3%
Laurel Hill Creek at A5	06/24/03	165.8	86.3%
Laurel Hill Creek at A5a	06/12/03	281.0	90.1%
Laurel Hill Creek at A6	06/12/03	254.0	81.4%
Laurel Hill Creek at A7	06/24/03	207.7	108.2%
Laurel Hill Creek at A8	06/12/03	236.0	75.6%
Laurel Hill Creek at A9	06/27/03	142.2	124.7%
Lost Creek	07/02/02	5.6	9.5%
May Run	---------- flow not measured ----------		
Moore Run	---------- flow not measured ----------		
Mose King Run	---------- flow not measured ----------		
Paddytown Hollow	---------- flow not measured ----------		

Table WR-2. Flow charateristics of Laurel Hill Creek watershed streams as measured during the summer of 2003.

Stream	Date	Flow (cfs)	Percent of flow at Ursina on that date
Sandy Run	06/10/03	31.1	6.6%
Shafer Run	06/09/03	36.3	5.4%
Shanks Run	---------- flow not measured ----------		
Showman Run	---------- flow not measured ----------		
Smith Hollow	---------- flow not measured ----------		
Spruce Run	---------- flow not measured ----------		
Whipkey Run	06/10/03	13.8	2.9%

A0 is downstream of the bridge at east crossing of Duck Pond Road

A1 is Clear Run; data shown under Clear Run

A2 is at the Somerset Borough Water Treatment Plant

A3 is downstream of the bridge at Jimtown Road

A4 is downstream of the Laurel Hill State Park Wastewater Treatment Plant

A4a is downstream of the confluence with Allen Creek

A5 is at the Barronvale Covered Bridge

A5a is at King's Bridge

A6 is at the bridge below Whipkey Dam

A7 is at the Game Lands No. 111 access

A8 is at the covered bridge downstream of the confluence with Paddytown Hollow

A9 is below Lower Humbert Covered Bridge

Table WR-3. Monthly and annual streamflow statistics for Laurel Hill Creek at Ursina, based on the period of record from 1919 to 2002 (*source: USGS, 2004*).

Month	Median Flow (cfs)	Mean Flow (cfs)	Average Monthly Minimum Flow (cfs)	Maximum Flow (cfs)
January	343	350	57	1141
February	385	405	89	1000
March	515	553	155	1331
April	438	444	114	879
May	306	315	52	689
June	151	184	21	700
July	85	103	9	388
August	62	98	9	416
September	46	80	6	608
October	69	115	6	564
November	205	218	9	1011
December	318	327	26	815
Overall	228	266	6	1331

Table WR-4. Stream designations as established by the PA DEP (2001).

Stream	Designation
Blue Hole Creek	EV
Cole Run	EV
Garys Run	EV
Jones Mill Run	EV
Allen Creek	HQ-CWF
Ansell Run	HQ-CWF
Buck Run	HQ-CWF
Clear Run	HQ-CWF
Coke Oven Hollow	HQ-CWF
Crab Run	HQ-CWF
Crab Run II (East of Allen Run)	HQ-CWF
Cranberry Glade Run	HQ-CWF
Crise Run	HQ-CWF
Fall Creek	HQ-CWF
Green King Run	HQ-CWF
Gross Run	HQ-CWF
Harbaugh Run	HQ-CWF
Keller Run	HQ-CWF
Kooser Run	HQ-CWF
Laurel Hill Creek	HQ-CWF
Lost Creek	HQ-CWF
May Run	HQ-CWF
Moore Run	HQ-CWF
Mose King Run	HQ-CWF
Paddytown Hollow	HQ-CWF
Sandy Run	HQ-CWF
Shafer Run	HQ-CWF
Shanks Run	HQ-CWF
Showman Run	HQ-CWF
Smith Hollow	HQ-CWF
Spruce Run	HQ-CWF
Whipkey Run	HQ-CWF

Table WR-5. Field monitoring sites and parameters conducted as part of this river conservation plan development.

Stream	Sampling Sites	Sampled in:			Assessments Made:				Additional Description of Locations
		Nov 2002	Summer 2003	Sep 2003	Flow	Habitat	Benthics	Water Quality	
Mainstem Stations									
Laurel Hill Creek: First crossing at Laurel Run Road	1			X				X	
Laurel Hill Creek: A.0 (east crossing at Duck Pond Road)	1		X		X	X	X	X	Downstream of bridge
	1			X		X	X	X	
Laurel Hill Creek: West crossing at Duck Pond Rd	1			X		X	X	X	
Laurel Hill Creek: A.2 (Somerset Borough Filtration Plant)	1			X				X	
Laurel Hill Creek: A.3 (Jimtown Bridge)	1		X		X	X	X	X	Below bridge
	1	X						X	At bridge
	1			X		X	X	X	

Table WR-5. Field monitoring sites and parameters conducted as part of this river conservation plan development.

Stream	Sampling Sites	Sampled in:			Assessments Made:				Additional Description of Locations
		Nov 2002	Summer 2003	Sep 2003	Flow	Habitat	Benthics	Water Quality	
Mainstem Stations									
Laurel Hill Creek: A.4 (downstream of Laurel Hill State Park WWTP)	1		X			X	X	X	
Laurel Hill Creek: A.4a (downstream of Allen Creek confluence)	1		X		X	X	X	X	
Laurel Hill Creek: A.5 (Barronvale Bridge)	1		X		X	X	X	X	Below bridge
Laurel Hill Creek: A.5a (King's Bridge)	1		X		X	X	X	X	Downstream of King's Bridge
Laurel Hill Creek: A.6 (bridge below Whipkey Dam)	1		X		X	X	X	X	Below Whipkey Dam bridge

Table WR-5. Field monitoring sites and parameters conducted as part of this river conservation plan development.

Stream	Sampling Sites	Sampled in:			Assessments Made:				Additional Description of Locations
		Nov 2002	Summer 2003	Sep 2003	Flow	Habitat	Benthics	Water Quality	
Mainstem Stations									
Laurel Hill Creek A.7 (State Game Lands 111 access)	1		X		X	X	X	X	Game Lands 111 access
Laurel Hill Creek: A.8 (covered bridge downstream of Paddytown Hollow confluence)	1		X		X	X	X	X	Below bridge
Laurel Hill Creek: A.9 (below Lower Humbert Covered Bridge)	1		X		X	X	X	X	Below Lower Humbert Covered Bridge
Laurel Hill Creek: at Ursina Bridge	1			X				X	

Table WR-5. Field monitoring sites and parameters conducted as part of this river conservation plan development.

Stream	Sampling Sites	Sampled in:			Assessments Made:				Additional Description of Locations
		Nov 2002	Summer 2003	Sep 2003	Flow	Habitat	Benthics	Water Quality	
Tributary Stations									
Allen Creek	1		X		X	X	X	X	
Ansell Run	---------- Unassessed ----------								
Blue Hole Creek	1		X		X	X	X	X	Upstream of bridge
	1			X		X	X		At road crossing
Buck Run	---------- Unassessed ----------								
Clear Run	1		X		X	X	X	X	
Coke Oven Hollow	---------- Unassessed ----------								
Cole Run	1		X		X	X	X	X	Downstream of bridge (Forbes State Forest)
	1			X		X	X		At road crossing
Crab Run (near Allenville)	---------- Unassessed ----------								
Crab Run (near Barronvale)	---------- Unassessed ----------								

Table WR-5. Field monitoring sites and parameters conducted as part of this river conservation plan development.

Stream	Sampling Sites	Sampled in: Nov 2002	Summer 2003	Sep 2003	Assessments Made: Flow	Habitat	Benthics	Water Quality	Additional Description of Locations
Tributary Stations									
Cranberry Glade Lake	---------- Unassessed ----------								
Cranberry Glade Run	1 1		X	 X		X	X	X X	Just upstream of A7 Just below lake
Crise Run	---------- Unassessed ----------								
Fall Creek	---------- Unassessed ----------								
Garys Run	---------- Unassessed ----------								
Green King Run	---------- Unassessed ----------								
Gross Run	---------- Unassessed ----------								
Harbaugh Run	---------- Unassessed ----------								
Jones Mill Run	1		X		X	X	X	X	
Keller Run	---------- Unassessed ----------								

Table WR-5. Field monitoring sites and parameters conducted as part of this river conservation plan development.

Stream	Sampling Sites	Sampled in:			Assessments Made:				Additional Description of Locations
		Nov 2002	Summer 2003	Sep 2003	Flow	Habitat	Benthics	Water Quality	
Tributary Stations									
Kooser Run	1		X		X	X	X	X	Upstream of ponds
	1	X						X	At Route 31 crossing
Laurel Hill Lake	---------- Unassessed ----------								
Lost Creek	1		X		X	X	X	X	Downstream of Scottyland WWTP
	1			X				X	Upstream of Scottyland WWTP
	1			X				X	At Scottyland WWTP
	1			X		X	X	X	Downstream of Scottyland WWTP
May Run	---------- Unassessed ----------								
Moore Run	---------- Unassessed ----------								
Mose King Run	---------- Unassessed ----------								

Table WR-5. Field monitoring sites and parameters conducted as part of this river conservation plan development.

Stream	Sampling Sites	Sampled in:			Assessments Made:				Additional Description of Locations
		Nov 2002	Summer 2003	Sep 2003	Flow	Habitat	Benthics	Water Quality	
Tributary Stations									
Paddytown Hollow	1		X			X	X	X	Downstream of bridge (Humbert Road crossing)
	1			X				X	
Sandy Run	1		X		X	X	X	X	Downstream of bridge (Sandy Run Road)
	1			X		X	X	X	
Shafer Run	1		X		X	X	X	X	Below bridge (Bakersville-Edie Road)
Shanks Run	---------- Unassessed ----------								
Showman Run	---------- Unassessed ----------								
Smith Hollow	---------- Unassessed ----------								
Spruce Run	---------- Unassessed ----------								
Whipkey Run	1		X		X	X	X	X	Downstream of Green King Run confluence

Table WR-6. Water quality data for the mainstem Laurel Hill Creek stations collected during the development of this river basin conservation plan.

Sampling Site	Water Quality Assessment	pH^2	pH^3	$Cond^1$	DO^1	$Temp^1$	$Temp^3$	$NO_3{}^1$	$NO_3{}^2$	$PO_4{}^1$	$PO_4{}^2$	$PO_4{}^3$	$NH_4{}^2$	$NH_4{}^3$
Laurel Hill Creek: First crossing at Laurel Run Road	*Fair*		7.2				67.5					0.03		0.05*
Laurel Hill Creek: A.0 (east crossing at Duck Pond Road)	*Fair*	6.4	7.3	158	7.3	70.8	67.5	2.0*		1.5*		0.02		0.07*
Laurel Hill Creek: West crossing at Duck Pond Road	*Good*		7.3				66.2					0.08		0.025
Laurel Hill Creek: A.2 (Somerset Borough Filtration Plant)	*Good*		7.4				64.6					0.06		0.01
Laurel Hill Creek: A.3 (Jimtown Bridge)	*Good*	6.5	7.3	154	9.6	69.6	60.6	0.5	0.28	0	0.02	0.10	0.03	0.005
Laurel Hill Creek: A.4 (downstream of Laurel Hill State Park WWTP)	*Good*	6.5		131	9.1	70.4				0				
Laurel Hill Creek: A.4a (downstream of Allen Creek confluence)	*Good*	6.6		256	9.7	66.5		0.5		0				
Laurel Hill Creek: A.5 (Barronvale Bridge)	*Good*	6.6		115	7.4	68.4		0.5		0				
Laurel Hill Creek: A.5a (King's Bridge)	*Good-Fair*	6.8		102	9.4	69.2		1.5*		0				
Laurel Hill Creek: A.6 (bridge below Whipkey Dam)	*Good*	6.6		101	9	67.2		0.5		0				

Table WR-6. Water quality data for the mainstem Laurel Hill Creek stations collected during the development of this river basin conservation plan.

Sampling Site	Water Quality Assessment	pH[1]	pH[3]	Cond[1]	DO[1]	Temp[1]	Temp[3]	NO_3[1]	NO_3[2]	PO_4[1]	PO_4[2]	PO_4[3]	NH_4[2]	NH_4[3]
Laurel Hill Creek: A.7 (State Game Lands 111 access)	*Good*	6.7		112	8.7	71.5		0.5		0.25				
Laurel Hill Creek: A.8 (covered bridge downstream of Paddytown Hollow confluence)	*Good-Fair*	6.5		94	10.7	65.4		1.75*		0.25				
Laurel Hill Creek: A.9 (below Lower Humbert Covered Bridge)	*Excellent-Good*	6.85		128	8.5	67.5		0.25		0.25				
Laurel Hill Creek at Ursina Bridge	*Fair*		8.1*				70.3*					0.11*		

[1] Collected by SCCD June-July 2003 (nutrients measured using a color comparator kit)

[2] Collected by Kleinschmidt November 2002 (nutrients measured using a colorimeter)

[3] Collected by Kleinschmidt September 2003 (nutrients measured using a colorimeter)

*Water quality assessment based primarily on this parameter(s)

Water Quality Assessment Categories:

Excellent Low NO_3 (<0.25), PO_4 (<0.05), and NH_4 levels (<0.01), neutral pH (7.0+/-0.3), and/or near saturation DO levels (>7.0)

Good Low to moderate NO_3 (<0.50), PO_4 (<0.10), and NH_4 levels (<0.03), near neutral pH (6.5-7.5), and/or elevated DO levels (>6.0)

Fair Moderate NO_3 (0.50-1.0), PO_4 (0.10-0.25), and NH_4 levels (0.03-0.10), elevated or depressed pH levels (5.5-8.5), and/or slightly depressed DO levels (>5.0)

Poor High NO_3 (>1.0), PO_4 (>0.10), and NH_4 levels (>0.10), acidic or basic pH conditions (<5.5 or >8.5), depressed DO levels (<5.0)

Table WR-7. Water quality data for tributaries to Laurel Hill Creek. Data collected during the development of this river basin conservation plan.

Sampling Site	Water Quality Assessment	pH[1]	pH[3]	Cond[1]	DO[1]	Temp[1]	Temp[3]	NO_3[1]	NO_3[2]	PO_4[1]	PO_4[2]	PO_4[3]	NH_4[2]	NH_4[3]
Allen Creek	*Good*	6.6		198	10.7	62		0.25		0.5				
Blue Hole Creek	*Excellent-Good*	6.8	6.8	27	10.3	62.8	60.8	0.25		0.5				
Clear Run	***Good-Fair*	6.8		233	10.2	63		0.25		0.5				
Cole Run	*Poor*	4.3	4.8*	33	8.9	61.5	61.2	0		0.5				
Cranberry Glade Run	*Good*	6.8		68	6.8									
Cranberry Glade Run just downstream of lake outfall	*Poor*		4.5*				60.4					0.22*		
Jones Mill Run	*Good-Fair*	5.9*		122	9.2	63.5		0.25		0.5				
Kooser Run	*Good-Fair*	6.6		202	10.2	64		0.5	0.37*	0.5	0.14*		0.01	
Lost Creek upstream of Scottyland WWTP outfall	*Good-Fair*		7.7				65.5					0.10*		0.02
Scottyland WWTP outfall at Lost Creek	*Poor*		7				66.9					5.22*		0.0
Lost Creek downstream of Scottyland WWTP outfall	*Good-Fair*	6.9	7.6	123	8.7	70.5	64.2			0		0.11*		
Paddytown Hollow	*Fair*	6.8	7.7	14	9.6	68.6	61.5			<1		0.23*		
Sandy Run	*Good*	6.8	6.0	42	10.5	66.7	63.9	0.25		0		0.05		0.005
Shafer Run	*Good*	6.6		53	10	62.4		0.25		0.5				
Whipkey Run	*Excellent-Good*	6.8		40	9.5	63.7		0.25		0.25				

Table WR-7. Water quality data for tributaries to Laurel Hill Creek. Data collected during the development of this river basin conservation plan.

Sampling Site	Water Quality Assessment	pH[1]	pH[3]	Cond[1]	DO[1]	Temp[1]	Temp[3]	NO_3[1]	NO_3[2]	PO_4[1]	PO_4[2]	PO_4[3]	NH_4[2]	NH_4[3]

[1] Collected by SCCD June-July 2003 (nutrients measured using a color comparator kit)

[2] Collected by Kleinschmidt November 2002 (nutrients measured using a colorimeter)

[3] Collected by Kleinschmidt September 2003 (nutrients measured using a colorimeter)

*Water quality assessment based primarily on this parameter(s)

**The water quality assessment was based on additional 2003 data on chloride concentrations (highway runoff)

Water Quality Assessment Categories:

Excellent Low NO_3 (<0.25), PO_4 (<0.05), and NH_4 levels (<0.01), neutral pH (7.0+/-0.3), and/or near saturation DO levels (>7.0)

Good Low to moderate NO_3 (<0.50), PO_4 (<0.10), and NH_4 levels (<0.03), near neutral pH (6.5-7.5), and/or elevated DO levels (>6.0)

Fair Moderate NO_3 (0.50-1.0), PO_4 (0.10-0.25), and NH_4 levels (0.03-0.10), elevated or depressed pH levels (5.5-8.5), and/or slightly depressed DO levels (>5.0)

Poor High NO_3 (>1.0), PO_4 (>0.10), and NH_4 levels (>0.10), acidic or basic pH conditions (<5.5 or >8.5), depressed DO levels (<5.0)

Table WR-8. Metals data for mainstem Laurel Hill Creek sites measured in 2003. Clear Run was also sampled.

Parameter	Units	Laurel Hill Creek A0	Clear Run	Laurel Hill Creek A2	Laurel Hill Creek A3	Laurel Hill Creek A4	Laurel Hill Creek A4A	Laurel Hill Creek A5
pH	pH units	7.2	7	7.2	7.1	7	7.3	7.6
Alkalinity	mg/L	57.2	12.2	25.8	26.2	23.8	25	21.6
Arsenic D	ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Lead D	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium D	ug/L	<7	<7	<7	<7	<7	<7	<7
Hot Acidity	mg/L	0	0	0	0	0	0	0
Mercury D	ug/L	<1	<1	<1	<1	<1	<1	<1
Specific Con	umhos/cm	197.7	391	212	201	167.1	198.1	160.5
Calcium D	mg/L	21.5	11.8	12.4	13.5	11.4	13.6	11.4
Magnesium D	mg/L	5.02	2.89	2.60	2.30	2.03	2.36	1.97
Sodium D	mg/L	8.2	51.1	21.4	18.5	15.3	18.4	14.6
Potassium D	mg/L	2.61	<1	1.24	1.23	1.36	1.31	<1.00
Cadmium D	ug/L	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Chromium D	ug/L	<50	<50	<50	<50	<50	<50	<50
Copper D	ug/L	<10	<10	<10	<10	<10	<10	<10
Iron D	ug/L	258	21	517	416	240	161	103
Manganese D	ug/L	272	31	120	105	42	18	<10
Nickle D	ug/L	<50	<50	<50	<50	<50	<50	<50
Zinc D	ug/L	<10	<10	<10	<10	<10	<10	<10
Aluminum D	ug/L	<200	<200	<200	<200	<200	<200	<200
TDS @ 105 C	mg/L	164	256	150	158	120	138	120
T SUSP Solids	mg/L	10	14	2	2	4	4	<2
Chloride	mg/L	16.3	190	44.5	38.8	31.1	40.4	30.5
Sulfate T	mg/L	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Field Test (pH)	pH units	6.3	6.7	6.7	6.9	7	7.1	7.4

D indicates dissolved fraction
T indicates total fraction

Table WR-8. Metals data for mainstem Laurel Hill Creek sites measured in 2003. Clear Run was also sampled.

Parameter	Units	Laurel Hill Creek A5A	Laurel Hill Creek A6	Laurel Hill Creek A7	Laurel Hill Creek A8	Laurel Hill Creek A9
pH	pH units	7.8	7.3	7.6	7.5	7.7
Alkalinity	mg/L	20.6	26.4	21	20.8	20.2
Arsenic D	ug/L	<4.0	<4.0	<4.0	<4.0	<4.0
Lead D	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium D	ug/L	<7	<7	<7	<7	<7
Hot Acidity	mg/L	0	0	0	0	0
Mercury D	ug/L	<1	<1	<1	<1	<1
Specific Con	umhos/cm	158.6	165	146.5	151.1	143.3
Calcium D	mg/L	11.1	12.5	9.86	11.2	10.4
Magnesium D	mg/L	2.00	2.19	1.84	2.22	1.98
Sodium D	mg/L	13.7	14.2	12.8	12.4	12.3
Potassium D	mg/L	1.35	1.13	<1.00	1.4	1.28
Cadmium D	ug/L	<10.0	<10.0	<10.0	<10.0	<10.0
Chromium D	ug/L	<50	<50	<50	<50	<50
Copper D	ug/L	<10	<10	<10	<10	<10
Iron D	ug/L	61	98	36	20	44
Manganese D	ug/L	11	170	<10	11	<10
Nickle D	ug/L	<50	<50	<50	<50	<50
Zinc D	ug/L	<10	<10	<10	<10	<10
Aluminum D	ug/L	<200	<200	<200	<200	<200
TDS @ 105 C	mg/L	156	110	100	96	94
T SUSP Solids	mg/L	<2	2	4	<2	<2
Chloride	mg/L	29.8	28.5	26.4	24.7	23.9
Sulfate T	mg/L	<20.0	<20.0	<20.0	28.5	20.6
Field Test (pH)	pH units	8.2	7.5	7.4	7.6	8.1

D indicates dissolved fraction
T indicates total fraction

Table BR-1. Habitat characteristics of Laurel Hill Creek at mainstem sampling stations, as measured during the summer 2003.

LAUREL HILL CREEK MAINSTEM STATIONS

Habitat Characteristics	A.0 - East crossing at Duck Pond Road	A.3 - Jimtown Bridge	A.4 - Downstream of Laurel Hill State Park WWTP	A.4a - Downstream of Allen Creek Confluence	A.5 - Barronvale Bridge	A.5a - King's Bridge	A.6 - Bridge Below Whipkey Dam	A.7 - State Game Lands 111 Access	A.8 - Covered Bridge Downstream of Paddytown Hollow Confluence	A.9 - Below Lower Humbert Covered Bridge
Average Stream Width (ft) at Representative Riffle:	25	60	80	80	100	80	112	50	60	100
Water Depth at Representative Riffle (ft):	0.7	2	1.5	1	1	2	1.5	1.5	1.3	1
Width to Depth Ratio at Representative Riffle:	35.7:1	30:1	53.3:1	80:1	100:1	40:1	74.7:1	33.3:1	46.2:1	100:1
Average Canopy Cover (%):	0	10	80	50	15	5	5	30	5	10
Predominant Land Use:	row crop ag.	field/pasture	forest	forest	forest	forest	forest	forest	forest	forest
Percentage of the Reach that has Aquatic Vegetation:	15	0	0	20	0	10	15	0	10	0
Percent of Stream Reach with a Tree/Shrub Riparian Zone:	10	100	100	100	100	100	90	100	100	100
Average Width of the Tree/Shrub Riparian Zone:	< 15	30 - 50	> 50	> 50	> 50	30 - 50	30 - 50	> 50	> 50	30 - 50
Unvegetated Stream Banks:	none	rare	none	none	none	none	rare	rare	none	rare
Bank Erosion Visible?	minor	moderate	none	none	minor	none	none	minor	minor	minor
Percentage that Gravel and/or Cobble is Surrounded by Fine Sediment (Sand or Silt):	0 - 25	> 75	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25
Odors or colors in Stream Substrate:	sewage	none	none	petroleum	none	none	none	none	some black on rocks	none
Percent Substrate Composition:										
Bedrock								20		
Boulder	30	10	20	30	20	30	15	30	10	20
Cobble	40	10	35	40	30	50	75	30	70	50
Gravel	10	10	35	20	30	15	5	10	15	20
Sand		35	10	10	20	5	5	10	2.5	10
Silt	20	35							2.5	
Overall Habitat Assessment:	Fair	Fair-Poor	Excellent-Good	Good	Good	Good	Good	Good	Good	Good

Table BR-1. Habitat characteristics of Laurel Hill Creek at mainstem sampling stations, as measured during the summer 2003.

LAUREL HILL CREEK MAINSTEM STATIONS

Habitat Characteristics	A.0 - East crossing at Duck Pond Road	A.3 - Jimtown Bridge	A.4 - Downstream of Laurel Hill State Park WWTP	A.4a - Downstream of Allen Creek Confluence	A.5 - Barronvale Bridge	A.5a - King's Bridge	A.6 - Bridge Below Whipkey Dam	A.7 - State Game Lands 111 Access	A.8 - Covered Bridge Downstream of Paddytown Hollow Confluence	A.9 - Below Lower Humbert Covered Bridge
Habitat Assessment Categories:										
Excellent	Significant canopy, forest land use, significant riparian zone coverage, no bank erosion, no occurence of gravel and/or cobble surrounded by fine sediment, and high composition of cobble and gravel substrate									
Good	Signicant canopy, primarily forest land use, > 50% riparian zone coverage, minimal bank erosion, low percentage of gravel and/or cobble surrounded by fine sediment, and a mix of the various substrates (cobble, gravel, boulder, with minimal fines)									
Fair	Limited canopy cover, land use other than forest (such as agriculture), limited riparian zone coverage (< 50%), moderate bank erosion, moderate to high percentage of gravel and/or cobble surrounded by fine sediment, and mix of fines and other substrates (cobble, boulder, gravel)									
Poor	No canopy, land use other than forest (such as agriculture), minimal to no riparian zone coverage, significant bank erosion, high percentage of gravel and/or cobble surrounded by fine sediment, and substrate consisting primarily of fines (sand, silt, and mud)									

Table BR-2. Habitat characteristics of Laurel Hill Creek tributary streams, as measured during the summer 2003.

LAUREL HILL CREEK TRIBUTARY STATIONS

Habitat Characteristics	Allen Creek	Blue Hole Creek	Clear Run	Cole Run	Cranberry Glade Run	Jones Mill Run	Kooser Run	Lost Creek	Paddytown Hollow	Sandy Run	Shafer Run	Whipkey Run
Average Stream Width (ft) at Representative Riffle:	15	30	20	15	15	20	20	6	10	25	15	20
Water Depth at Representative Riffle (ft):	1	1	0.7	0.5	1	1.2	1	0.7	0.3	1.5	1.3	1.5
Width to Depth Ratio at Representative Riffle:	15:1	30:1	28.6:1	30:1	15:1	16.7:1	20:1	8.6:1	33.3:1	16.7:1	11.5:1	13.3:1
Average Canopy Cover (%):	90	90	50	90	50	90	90	90	50	95	90	90
Predominant Land Use:	forest	forest	forest	forest	forest	forest	forest	forest	forest	forest	forest	forest
Percentage of the Reach that has Aquatic Vegetation:	0	5	0	0	0	0	0	10	50	10	0	10
Percent of Stream Reach with a Tree/Shrub Riparian Zone:	85	100	95	100	50	100	100	100	80	100	100	100
Average Width of the Tree/Shrub Riparian Zone:	> 50	> 50	> 50	> 50	> 50	> 50	> 50	> 50	15 - 30	> 50	> 50	> 50
Unvegetated Stream Banks:	none	rare	none	none		rare	rare	none	rare	rare	rare	rare
Bank Erosion Visible?	none	none	none	none		none	none	moderate		none	none	none
Percentage that Gravel and/or Cobble is Surrounded by Fine Sediment (Sand or Silt):	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	0 - 25	25 - 50	0 - 25	0 - 25	0 - 25
Odors or colors in Stream Substrate:	none	none	none	none	none	none	none	none	none	none	none	none
Percent Substrate Composition:												
Bedrock									10			
Boulder	*5*	20	40	15	10	5	10	40	30	40	10	85
Cobble	*45*	30	10	50	40	80	50	30	30	50	70	10
Gravel	*40*	40	40	35	30	10	30	20	20	10	15	5
Sand	*10*	10	10		10	5	10	10			5	
Silt					10				10			
Overall Habitat Assessment:	Excellent	Excellent	Excellent-Good	Excellent	Good	Excellent	Excellent	Good	Good-Fair	Excellent-Good	Excellent-Good	Good

Table BR-2. Habitat characteristics of Laurel Hill Creek tributary streams, as measured during the summer 2003.

LAUREL HILL CREEK TRIBUTARY STATIONS

Habitat Characteristics	Allen Creek	Blue Hole Creek	Clear Run	Cole Run	Cranberry Glade Run	Jones Mill Run	Kooser Run	Lost Creek	Paddytown Hollow	Sandy Run	Shafer Run	Whipkey Run
Habitat Assessment Categories:												
Excellent	Significant canopy, forest land use, significant riparian zone coverage, no bank erosion, no occurence of gravel and/or cobble surrounded by fine sediment, and high composition of cobble and gravel substrate											
Good	Signicant canopy, primarily forest land use, > 50% riparian zone coverage, minimal bank erosion, low percentage of gravel and/or cobble surrounded by fine sediment, and a mix of the various substrates (cobble, gravel, boulder, with minimal fines)											
Fair	Limited canopy cover, land use other than forest (such as agriculture), limited riparian zone coverage (< 50%), moderate bank erosion, moderate to high percentage of gravel and/or cobble surrounded by fine sediment, and mix of fines and other substrates (cobble, boulder, gravel)											
Poor	No canopy, land use other than forest (such as agriculture), minimal to no riparian zone coverage, significant bank erosion, high percentage of gravel and/or cobble surrounded by fine sediment, and substrate consisting primarily of fines (sand, silt, and mud)											

Table BR-3. Summary of 2003 benthic macroinvertebrate sampling data for stations on the mainstem Laurel Hill Creek.

Laurel Hill Creek Sampling Station	*EPT Test Score*	*Sensitivity Score*	*Overall Benthic Assessment*
A.0 - East crossing at Duck Pond Road	Excellent	Good	Excellent-Good
West Crossing at Duck Pond Road	Excellent	Excellent	Excellent
A.3 - Jimtown Bridge	Excellent	Excellent	Excellent
A.4 - Downstream of Laurel HillState Park WWTP	Excellent	Excellent	Excellent
A.4a - Downstream of Allen Creek Confluence	Excellent	Fair	Good
A.5 - Barronvale Bridge	Excellent	Excellent	Excellent
A.5a - King's Bridge	Excellent	Excellent	Excellent
A.6 - Bridge below Whipkey Dam	Excellent	Excellent	Excellent
A.7 - State Game Lands 111 Access	Excellent	Excellent	Excellent
A.8 - Covered Bridge Downstream of Paddytown Hollow Confluence	Excellent	Excellent	Excellent
A.9 - Below Lower Humbert Covered Bridge	Excellent	Excellent	Excellent

See Appendix A for the benthic data and scoring sheets/information.

Table BR-4. Summary of 2003 benthic macroinvertebrate sampling data for stations on tributaries to Laurel Hill Creek.

Tributary Stream Sampling Station	*EPT Test Score*	*Sensitivity Score*	*Overall Benthic Assessment*
Allen Creek	Excellent	Excellent	Excellent
Blue Hole Creek	Excellent	Excellent	Excellent
Clear Run	Failed	Fair	Fair-Poor
Cole Run	Excellent	Good	Excellent-Good
Cranberry Glade Run	Excellent	Excellent	Excellent
Jones Mill Run	Excellent	Excellent	Excellent
Kooser Run	Excellent	Excellent	Excellent
Lost Creek-Upstream of Scottyland WWTP Outfall	Excellent	Excellent	Excellent
Paddytown Hollow	Excellent	Good	Excellent-Good
Sandy Run	Excellent	Excellent	Excellent
Shafer Run	Excellent	Excellent	Excellent
Whipkey Run	Excellent	Good	Excellent-Good

See Appendix A for the benthic data and scoring sheets/information.

Table BR-5. Stream health assessment of the mainstem Laurel Hill Creek and twelve tributaries based on historic data and 2002-2003 field monitoring conducted as part of this River Basin Conservation Plan development.

Stream	Overall Stream Health	Habitat Assessment	Benthic Assessment	Water Quality Assessment	Historic Data Synopsis
Mainstem Stations					
Laurel Hill Creek @ 1st crossing of Laurel Run Rd	Fair	---------- Unassessed ----------		Fair	Elevated nitrates and moderately low pH/alkalinity levels, but PFBC data has shown an improvement in WQ in upper reaches from 1978 to 1994 with sedimentation problems still present, relatively high invertebrate diversity/abundance especially in lower reaches, trout present (stocked).
Laurel Hill Creek A.0 (east crossing of Duck Pond Rd)	Fair	Fair	Excellent-Good	Fair	
Laurel Hill Creek @ west crossing of Duck Pond Rd	Good	--- Unassessed ---	Excellent	Good	
Laurel Hill Creek A.2 (Somerset Boro Filtration Plant Reservoir)	Good	---------- Unassessed ----------		Good	
Laurel Hill Creek A.3 (Jimtown Bridge)	Good-Fair	Fair-Poor	Excellent	Good	It was not possible to correlate the historic data to the stations used in 2002-2003. However, the historic data support the findings of the 2002-2003 field monitoring data collection.
Laurel Hill Creek A.4 (d.s. of Laurel Hill State Park WWTP)	Excellent-Good	Excellent-Good	Excellent	Good	
Laurel Hill Creek A.4a (d.s. of Allen Creek confluence)	Good	Good	Good	Good	
Laurel Hill Creek A.5 (Barronvale Bridge)	Good	Good	Excellent	Good	
Laurel Hill Creek A.5a (King's Bridge)	Good	Good	Excellent	Good-Fair	
Laurel Hill Creek A.6 (bridge below Whipkey Dam)	Good	Good	Excellent	Good	
Laurel Hill Creek A.7 (Game Lands 111 Access)	Good	Good	Excellent	Good	

Table BR-5. Stream health assessment of the mainstem Laurel Hill Creek and twelve tributaries based on historic data and 2002-2003 field monitoring conducted as part of this River Basin Conservation Plan development.

Stream	Overall Stream Health	Habitat Assessment	Benthic Assessment	Water Quality Assessment	Historic Data Synopsis
Laurel Hill Creek A.8 (covered bridge d.s. of Paddytown Hollow confluence)	Good	Good	Excellent	Good-Fair	See notes above.
Laurel Hill Creek A.9 (below Lower Humbert Covered Bridge)	Excellent-Good	Good	Excellent	Excellent-Good	
Laurel Hill Creek @ Ursina Bridge	Fair	---------- Unassessed ----------		Fair	

Table BR-5. Stream health assessment of the mainstem Laurel Hill Creek and twelve tributaries based on historic data and 2002-2003 field monitoring conducted as part of this River Basin Conservation Plan development.

Stream	Overall Stream Health	Habitat Assessment	Benthic Assessment	Water Quality Assessment	Historic Data Synopsis
Tributary Stations					
Allen Creek	Excellent	Excellent	Excellent	Good	Elevated nutrient levels, high density of invertebrates, reproducing trout pop.
Ansell Run	Fair[1]	---------- Unassessed ----------			High Al conc & low pH, no fish (one data set)
Blue Hole Creek	Excellent	Excellent	Excellent	Excellent-Good	Low alkalinity/hardness, acid tolerant invertebrates, reproducing brook trout
Buck Run	Fair[1]	---------- Unassessed ----------			Reduced pH and alkalinity, invertebrates limited by low pH, reproducing brook trout in upper reaches
Clear Run	Fair	Excellent-Good	Fair-Poor	Good-Fair	Low alkalinity & high cond., limited invertebrate diversity, reproducing trout pop.
Coke Oven Hollow	---------- Unassessed ----------				No Data
Cole Run	Good-Fair	Excellent	Excellent-Good	Poor	Low pH/alkalinity/hardness, avg number of invertebrate taxa collected, no fish
Crab Run (near Allenville)	Good[1]	---------- Unassessed ----------			Good WQ (one set of data)
Crab Run (near Barronvale)	---------- Unassessed ----------				No Data
Cranberry Glade Lake	Fair[1]	---------- Unassessed ----------			Low alkalinity, no trout (96-97)

Table BR-5. Stream health assessment of the mainstem Laurel Hill Creek and twelve tributaries based on historic data and 2002-2003 field monitoring conducted as part of this River Basin Conservation Plan development.

Stream	Overall Stream Health	Habitat Assessment	Benthic Assessment	Water Quality Assessment	Historic Data Synopsis
Cranberry Glade Run	Excellent-Good	Good	Excellent	Good	Low pH/alkalinity/hardness, questionable fish pop.
Cranberry Glade Run (d.s. of Cranberry Glade Lake outfall)	Poor	---------- Unassessed ----------		Poor	See above
Crise Run	Fair[1]	---------- Unassessed ----------			Low pH/alkalinity/hardness (one data set)
Fall Creek	Fair[1]	---------- Unassessed ----------			Reduced pH/alkalinity/hardness levels, questionable fish pop.
Garys Run	---------- Unassessed ----------				No Data
Green King Run	---------- Unassessed ----------				No Data
Gross Run	Poor[1]	---------- Unassessed ----------			Low pH/alkalinity/hardness, acid tolerant invertebrates, no fish (high Al conc.)
Harbaugh Run	Fair[1]	---------- Unassessed ----------			Low alkalinity/hardness, questionable fish pop. (1978-1980)
Jones Mill Run	Excellent-Good	Excellent	Excellent	Good-Fair	High nitrates, high density of invertebrates, reproducing trout pop.
Keller Run	---------- Unassessed ----------				No Data
Kooser Run	Good-Fair	Excellent	Excellent	Good-Fair	High nitrates, moderately high invertebrate density, stocked trout pop.

Table BR-5. Stream health assessment of the mainstem Laurel Hill Creek and twelve tributaries based on historic data and 2002-2003 field monitoring conducted as part of this River Basin Conservation Plan development.

Stream	Overall Stream Health	Habitat Assessment	Benthic Assessment	Water Quality Assessment	Historic Data Synopsis
Laurel Hill Lake	---------- Unassessed ----------				No Data
Lost Creek (u.s. of Scottyland WWTP outfall)	Good	--- Unassessed ---	Excellent	Good-Fair	See below
Lost Creek (at Scottyland WWTP outfall)	Poor	---------- Unassessed ----------		Poor	See below
Lost Creek (d.s. of Scottyland WWTP outfall)	Good-Fair	Good	--- Unassessed ---	Good-Fair	Good WQ (just above confluence with LHC)
May Run	Fair[1]	---------- Unassessed ----------			Moderately low pH/alkalinity (1997)
Moore Run	---------- Unassessed ----------				No Data
Mose King Run	---------- Unassessed ----------				No Data
Paddytown Hollow	Fair	Good-Fair	Excellent-Good	Fair	No Data
Sandy Run	Excellent-Good	Excellent-Good	Excellent	Good	Low pH/alkalinity/hardness, low invertebrate diversity, presence of trout pop. (1977-1982)
Shafer Run	Excellent-Good	Excellent-Good	Excellent	Good	High nitrates, moderate invertebrate density, reproducing trout pop.
Shanks Run	---------- Unassessed ----------				No Data
Showman Run	---------- Unassessed ----------				No Data
Smith Hollow	---------- Unassessed ----------				No Data

Table BR-5. Stream health assessment of the mainstem Laurel Hill Creek and twelve tributaries based on historic data and 2002-2003 field monitoring conducted as part of this River Basin Conservation Plan development.

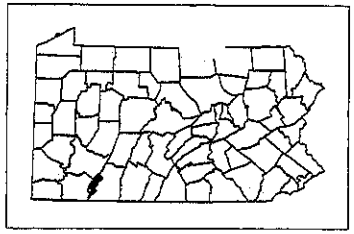
Stream	Overall Stream Health	Habitat Assessment	Benthic Assessment	Water Quality Assessment	Historic Data Synopsis
Spruce Run	Poor[1]	---------- Unassessed ----------			Low pH & no fish (1987)
Whipkey Run	Excellent-Good	Good	Excellent-Good	Excellent-Good	No Data

[1] Overall Health Assessment is based on historical data only. Stream health conditions may have changed since the historic data were collected.

Table BR-6. Species of special concern in the Laurel Hill Creek watershed.

Scientific Name	Common Name	Type of Species	Current Status	Proposed Status
Flora:				
Luzula bulbosa	southern wood-rush	herbaceous plant	undetermined	PA endangered
Najas gracillima	bushy naiad	aquatic plant	PA threatened	PA threatened
Platanthera peramoena	purple-fringeless orchid	herbaceous plant	undetermined	PA threatened
Viola appalachiensis	Appalachian blue violet	herbaceous plant	PA threatened	undetermined
Cimicifuga americana	American bugbane	herbaceous plant	PA threatened	PA rare
Pyrulaira pubera	buffalo-nut	shrub	PA rare	PA rare
Trautvetteria caroliniensis	carolina tassel-rue	herbaceous plant	PA rare	PA rare
Fauna:				
Myotis sodalis	Indiana bat	bat	Federally endangered	Federally endangered
Myotis septentrionalis	Northern Myotis bat	bat	PA species of concern	PA species of concern
Myotis leibii	Small-footed Myotis bat	bat	PA threatened	PA threatened
Neotoma magister	Eastern woodrat		PA threatened	PA threatened
Sorex palustris albibarbis	Northern water shrew	shrew	PA threatened	PA threatened
Sorex palustris punctulaus	West Virginia water shrew	shrew	PA species of concern	PA species of concern
Lutra Canadensis	Northern river otter	otter	PA at risk species	PA at risk species
Crotalus horridus	Timber rattlesnake	snake	PA candidate	PA candidate
Pandion haliaetus	Osprey	bird	PA threatened	PA threatened
Haliaeetus leucocephalus	Bald Eagle	bird	PA endangered	PA endangered
Bartrimia longicuada	Upper sandpiper	bird	PA threatened	PA threatened

Figures



River Conservation Plan
Laurel Hill Creek Watershed
Somerset County, Pennsylvania

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Figure 2 - Land Use Maps
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Figure 7 - Farmland Designation Maps
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Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Map Index

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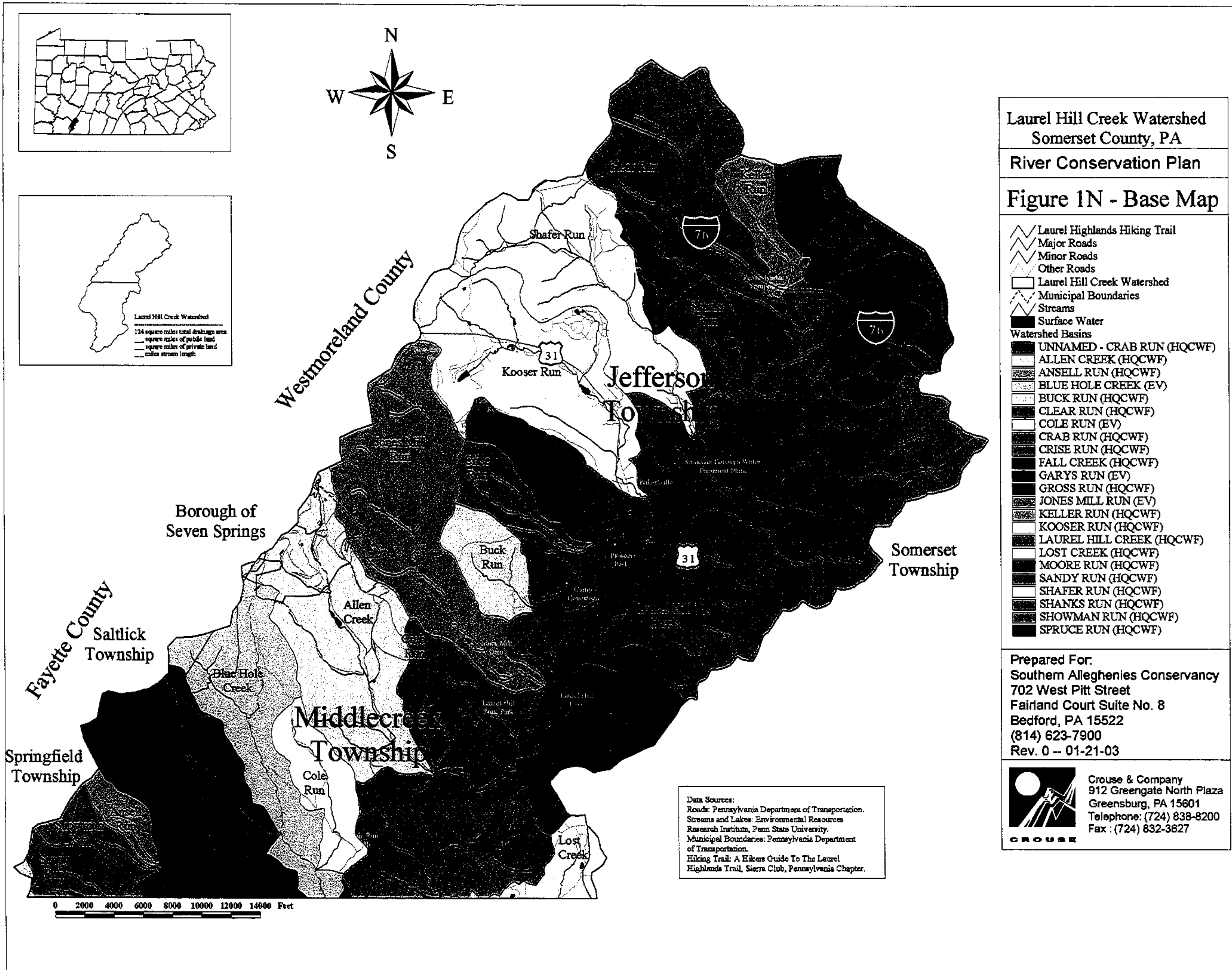
Laurel Hill Creek Watershed
Somerset County, PA
River Conservation Plan
Figure 1N - Base Map
Laurel Highlands Hiking Trail
Major Roads
Minor Roads
Other Roads
Laurel Hill Creek Watershed
Municipal Boundaries
Streams
Surface Water
Watershed Basins
UNNAMED - CRAB RUN (HQCWF)
ALLEN CREEK (HQCWF)
ANSELL RUN (HQCWF)
BLUE HOLE CREEK (EV)
BUCK RUN (HQCWF)
CLEAR RUN (HQCWF)
COLE RUN (EV)
CRAB RUN (HQCWF)
CRISE RUN (HQCWF)
FALL CREEK (HQCWF)
GARYS RUN (EV)
GROSS RUN (HQCWF)
JONES MILL RUN (EV)
KELLER RUN (HQCWF)
KOOSER RUN (HQCWF)
LAUREL HILL CREEK (HQCWF)
LOST CREEK (HQCWF)
MOORE RUN (HQCWF)
SANDY RUN (HQCWF)
SHAFER RUN (HQCWF)
SHANKS RUN (HQCWF)
SHOWMAN RUN (HQCWF)
SPRUCE RUN (HQCWF)
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CROUSE
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W
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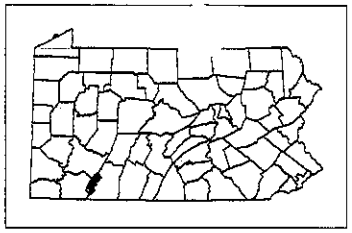
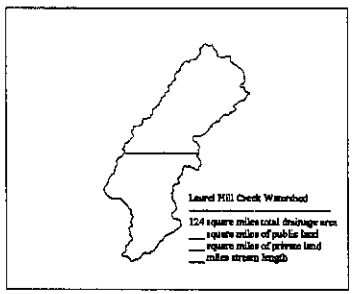
S
Laurel Hill Creek Watershed
124 square miles total drainage area
___ square miles of public land
___ square miles of private land
___ miles stream length
Westmoreland County
Fayette County
Borough of Seven Springs
Saltlick Township
Springfield Township
Somerset Township
Jefferson Township
Middlecreek Township
Shafer Run
Kooser Run
Buck Run
Allen Creek
Blue Hole Creek
Cole Run
Lost Creek
76
31
Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Hiking Trail: A Hikers Guide To The Laurel Highlands Trail, Sierra Club, Pennsylvania Chapter.
0 2000 4000 6000 8000 10000 12000 14000 Feet





Blue Hole Creek

Lost Creek

Fayette County

Springfield Township

Stewart Township

Mose King Run

Drake Run

281

Paddytown Hollow

Confluence Borough

Ursina Borough

N

W E

S

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 1S - Base Map

- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Watershed Basins

- COKE OVEN HOLLOW (HQCWF)
- PADDYTOWN HOLLOW (HQCWF)
- SMITH HOLLOW (HQCWF)
- BLUE HOLE CREEK (EV)
- CLAY RUN (HQCWF)
- CRANBERRY GLADE RUN (HQCWF)
- DRAKE RUN (HQCWF)
- FALL CREEK (HQCWF)
- GREEN KING RUN (HQCWF)
- HARBAUGH RUN (HQCWF)
- LAUREL HILL CREEK (HQCWF)
- LOST CREEK (HQCWF)
- MAY RUN (HQCWF)
- MOSE KING RUN (HQCWF)
- SANDY RUN (HQCWF)
- WHIPKEY RUN (HQCWF)

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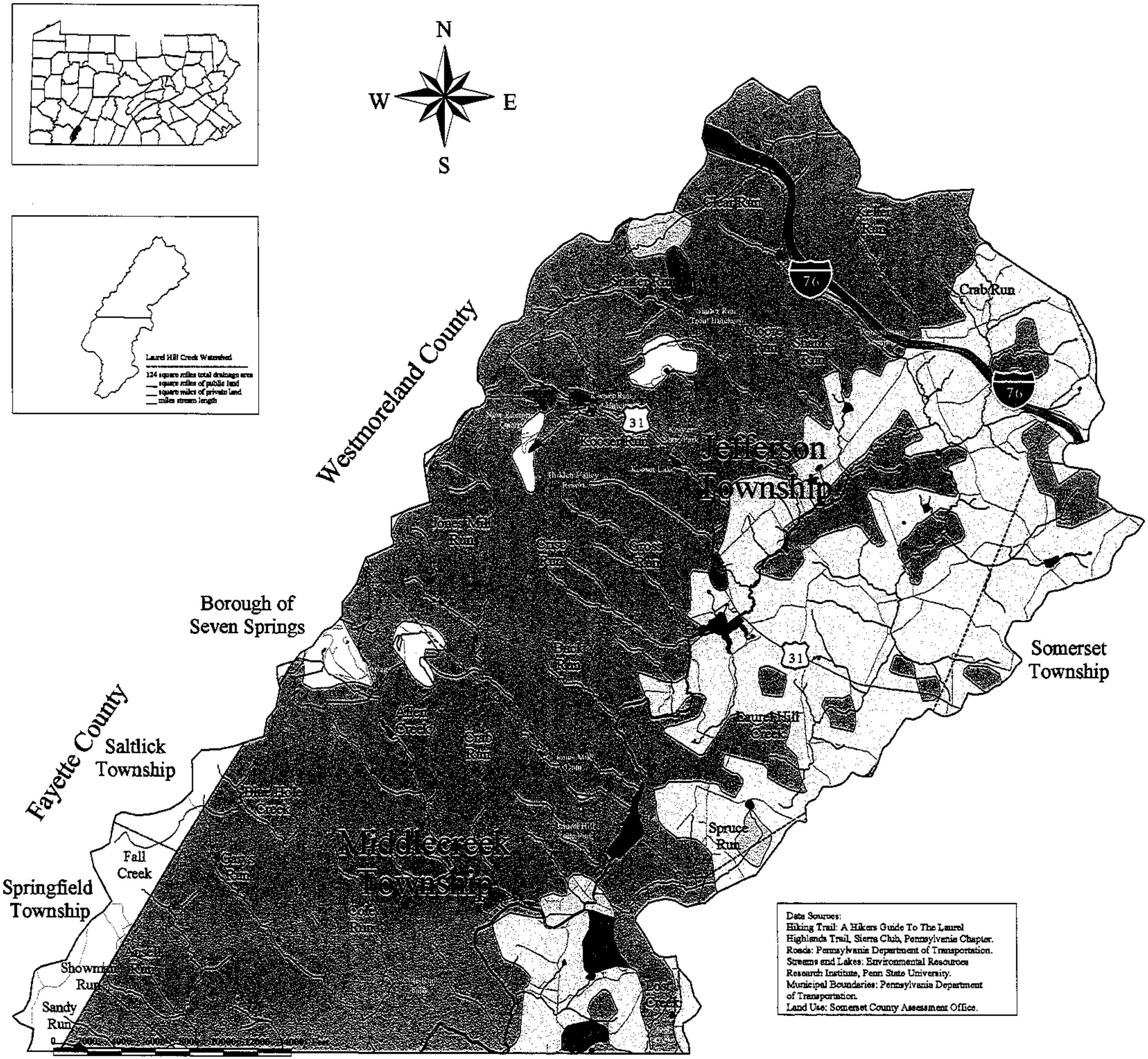

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 2N - Land Use

- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Land Use
- body of water
- cropland and pastures
- deciduous forest land
- evergreen forest land
- mixed forest land
- other agricultural land
- other urban land
- residential
- strip mines
- transitional areas
- transportation/utilities

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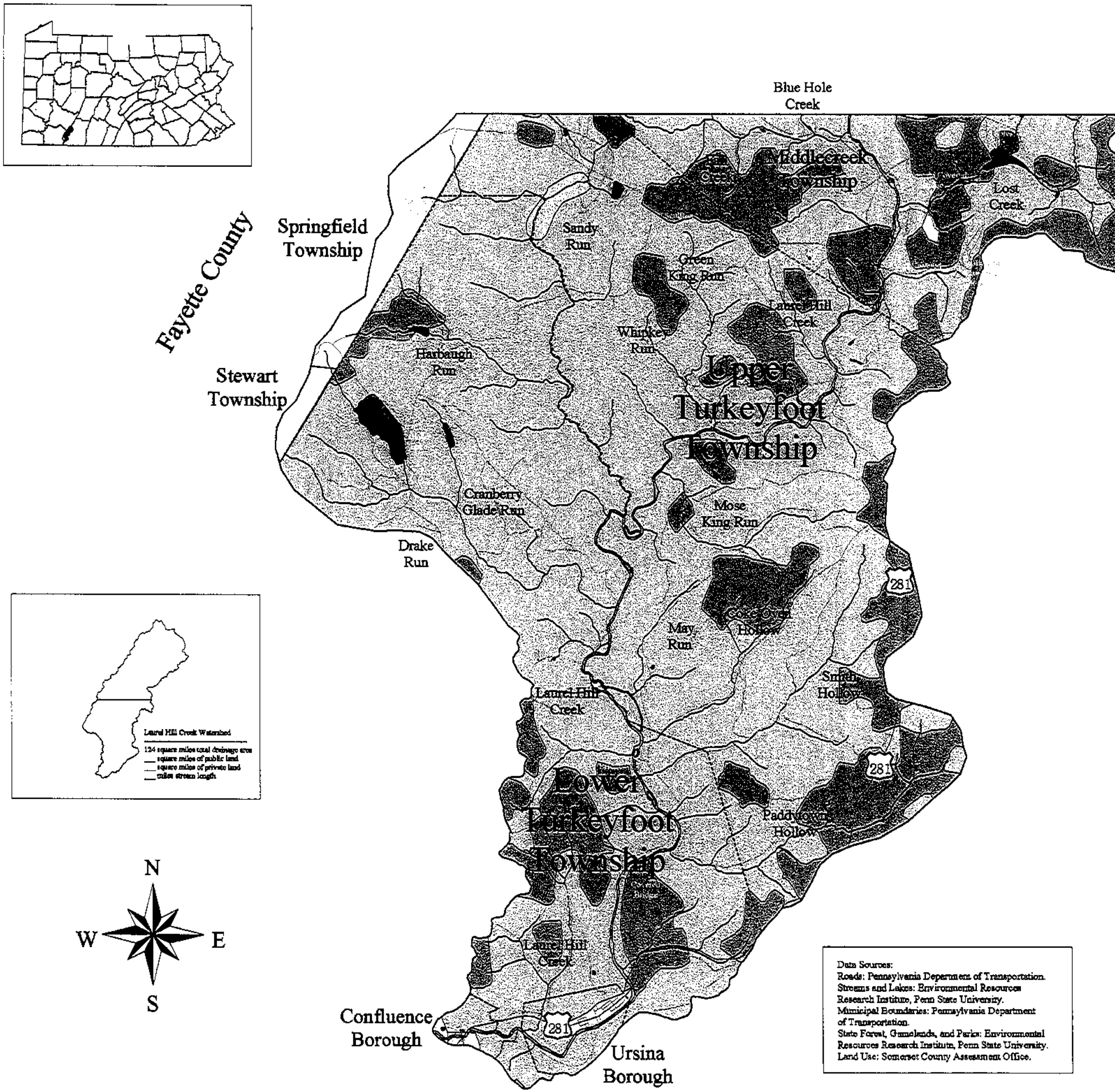
Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 2S - Land Use



- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Land Use
- body of water
- commercial and services
- cropland and pastures
- deciduous forest land
- evergreen forest land
- other urban land
- residential
- transitional areas

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
State Forest, Gamelands, and Parks: Environmental Resources Research Institute, Penn State University.
Land Use: Somerset County Assessment Office.

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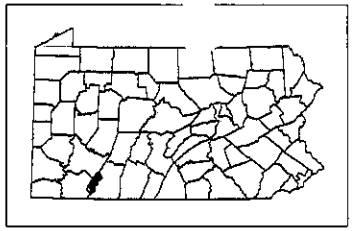

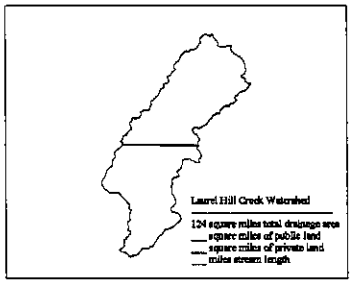

N
W E
S

Westmoreland County

Fayette County

Borough of Seven Springs

Saltlick Township

Jefferson Township

Somerset Township

Shafer Run

Crab Run

Shanks Run

Jones Mill Run

Laurel Hill Creek

Spruce Run

Data Sources:
Hiking Trail: A Hikers Guide To The Laurel Highlands Trail, Sierra Club, Pennsylvania Chapter.
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Surface Geology: Environmental Resources Research Institute, Penn State University.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 3N - Surface Geology

- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Surface Geology
- Allegheny Group
- Burgoon Sandstone
- Casselman Formation
- Glenshaw Formation
- Mauch Chunk Formation
- Pottsville Group

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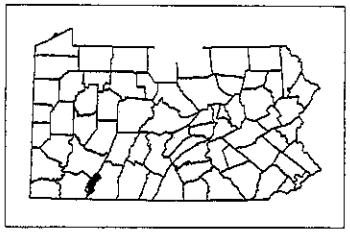

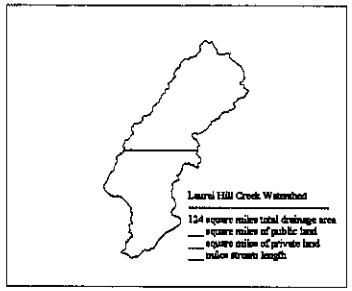

Blue Hole Creek

Fayette County

Springfield Township

Stewart Township

Middlecreek Township

Lost Creek

Upper Turkeyfoot Township

Lower Turkeyfoot Township

Confluence Borough

Ursina Borough

Drake Run

Mose King Run

May Run

Coke Oven Hollow

Smith Hollow

Paddytown Hollow

Laurel Hill Creek

281

N

W E

S

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Surface Geology: Environmental Resources Research Institute, Penn State University.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 3S - Surface Geology

- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Surface Geology

- Allegheny Group
- Burgoon Sandstone
- Casselman Formation
- Glenshaw Formation
- Mauch Chunk Formation
- Pottsville Group

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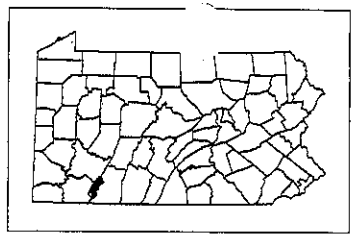

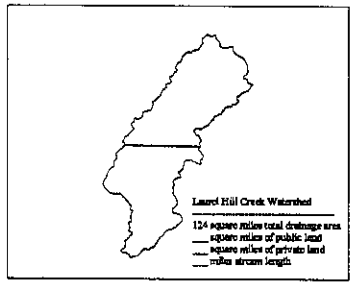

N
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Westmoreland County

Borough of Seven Springs

Somerset Township

Fayette County

Saltlick Township

Springfield Township

Fall Creek

Data Sources:
Hiking Trail: A Hikers Guide To The Laurel Highlands Trail, Sierra Club, Pennsylvania Chapter.
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Soil Associations: Natural Resources Conservation Service.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 4N - Soil Associations

- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Soil Associations
- Albrights
- Arnagh
- Atkins
- Berks Channery
- Berks-Weikert
- Blairton Channery
- Brinkerton
- Cavode
- Chavies
- Cookport
- Dekalb-Hazelton
- Ernest
- Fluvaquents
- Hazleton
- Leck Kill
- Monongahela
- Nolo
- Philo
- Purdy
- Quarries
- Rayne-Gilpin
- Tyler
- Udorthents
- Water
- Wharton

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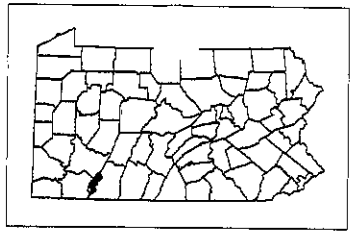

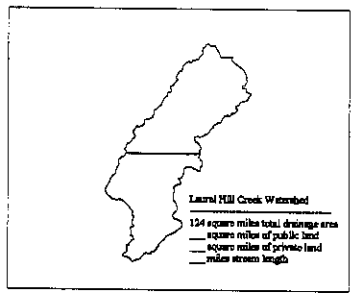

Blue Hole Creek

Fayette County

Springfield Township

Stewart Township

Drake Run

Confluence Borough

Ursina Borough

281

N

W

E

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Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Soil Associations: Natural Resources Conservation Service.

Laurel Hill Creek Watershed
Somerset County, PA
River Conservation Plan
Figure 4S - Soil Associations

- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Soil Associations

- Albrights
- Allegheny
- Armagh
- Atkins
- Berks
- Berks-Weikert
- Blairton
- Brinkerton
- Cavode
- Chavies
- Cookport
- Dekalb-Hazleton
- Ernest
- Fluvaquents
- Hazleton
- Leck Kill
- Monongahela
- Nolo
- Philo
- Pope
- Purdy
- Rayne-Gilpin
- Tyler
- Udorthents
- Water
- Wharton

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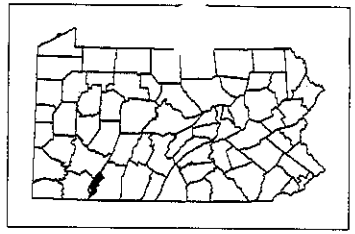

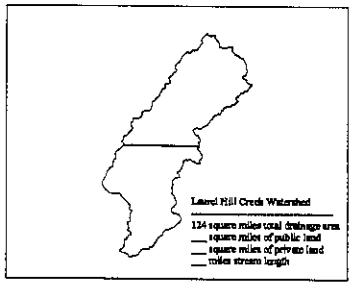

N
W E
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Westmoreland County

Borough of Seven Springs

Somerset Township

Fayette County

Saltlick Township

Springfield Township

Fall Creek

Sandy Run

Data Sources:
Hiking Trail: A Hikers Guide To The Laurel Highlands Trail, Sierra Club, Pennsylvania Chapter.
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Soil Associations: Natural Resources Conservation Service.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 5N - Hydrologic Soils

- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Hydrologic Soils
- B
- C
- D
- Not Assigned
- Water

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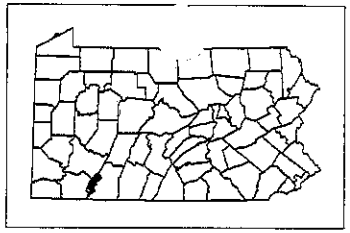

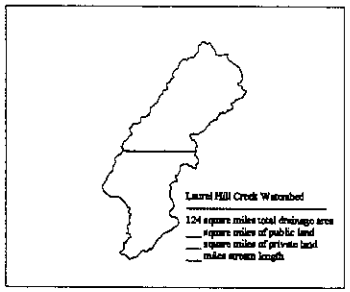

Blue Hole Creek

Fayette County

Springfield Township

Stewart Township

Drake Run

281

Confluence Borough

Ursina Borough

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W

E

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Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Hydrologic Soils: Natural Resources Conservation Service.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 5S - Hydrologic Soils

- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Hydrologic Soils

- B
- C
- D
- Not Assigned
- Water

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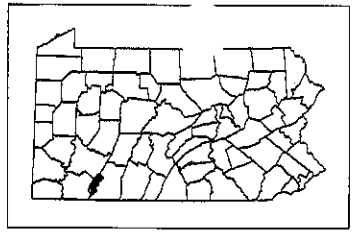

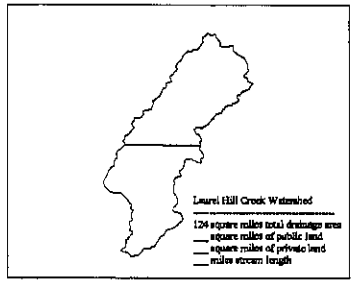

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W E
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Jefferson Township

Borough of Seven Springs

Somerset Township

Fayette County

Saltlick Township

Fall Creek

Shownee Run

Sandy Run

Laurel Hill Creek

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Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Soil Erodibility: Natural Resources Conservation Service.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 6N -
Soil Erodibility

- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Soil Erodibility
- Moderate
- Not Assigned
- Severe
- Slight
- Water

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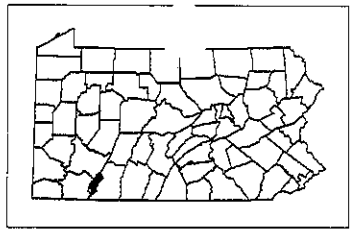

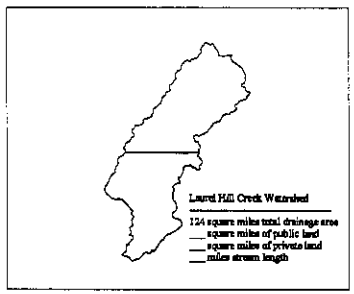

Blue Hole Creek

Fayette County

Springfield Township

Stewart Township

Drake Run

281

281

281

Confluence Borough

Ursina Borough

N

W

E

S

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Soil Erodibility: Natural Resources Conservation Service.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 6S - Soil Erodibility

- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Soil Erodibility

- Moderate
- Not Assigned
- Severe
- Slight
- Water

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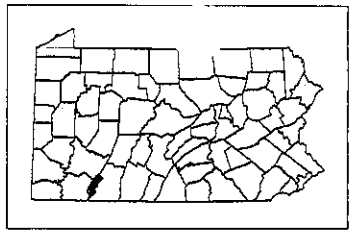

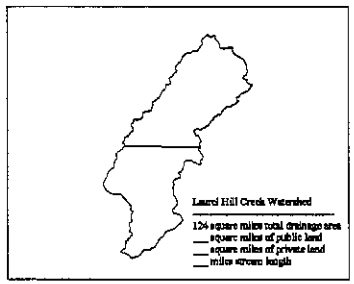

N
W E
S

Westmoreland County

Borough of Seven Springs

Somerset Township

Fayette County

Saltlick Township

Springfield Township

Fall Creek

Shownee Run

Sandy Run

Gross Run

76

31

0 2000 4000 6000 8000 10000 12000 14000 Feet

Data Sources:
Hiking Trail: A Hikers Guide To The Laurel Highlands Trail, Sierra Club, Pennsylvania Chapter.
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Farmland Designations: Somerset Conservation District.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 7N - Farmland Designations

- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Farmland Designations
- Farmland of Statewide Importance
- Hydric Inclusions
- Hydric Soils
- Not Assigned
- Prime Farmland
- Water

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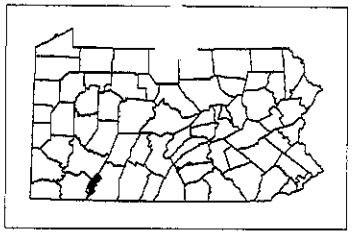

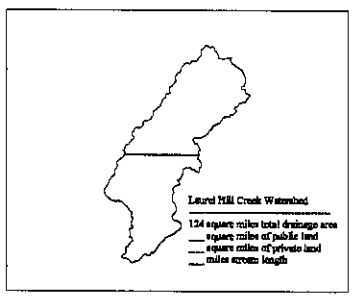

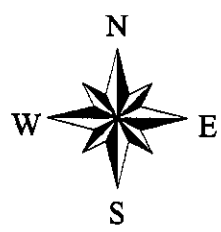

Blue Hole Creek

Fayette County

Springfield Township

Stewart Township

Drake Run

Confluence Borough

Ursina Borough

281

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Farmland Designations: Somerset Conservation District.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 7S - Farmland Designations

- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Farmland Designations
- Farmland of Statewide Importance
- Hydric Inclusions
- Hydric Soils
- Not Assigned
- Prime Farmland
- Water

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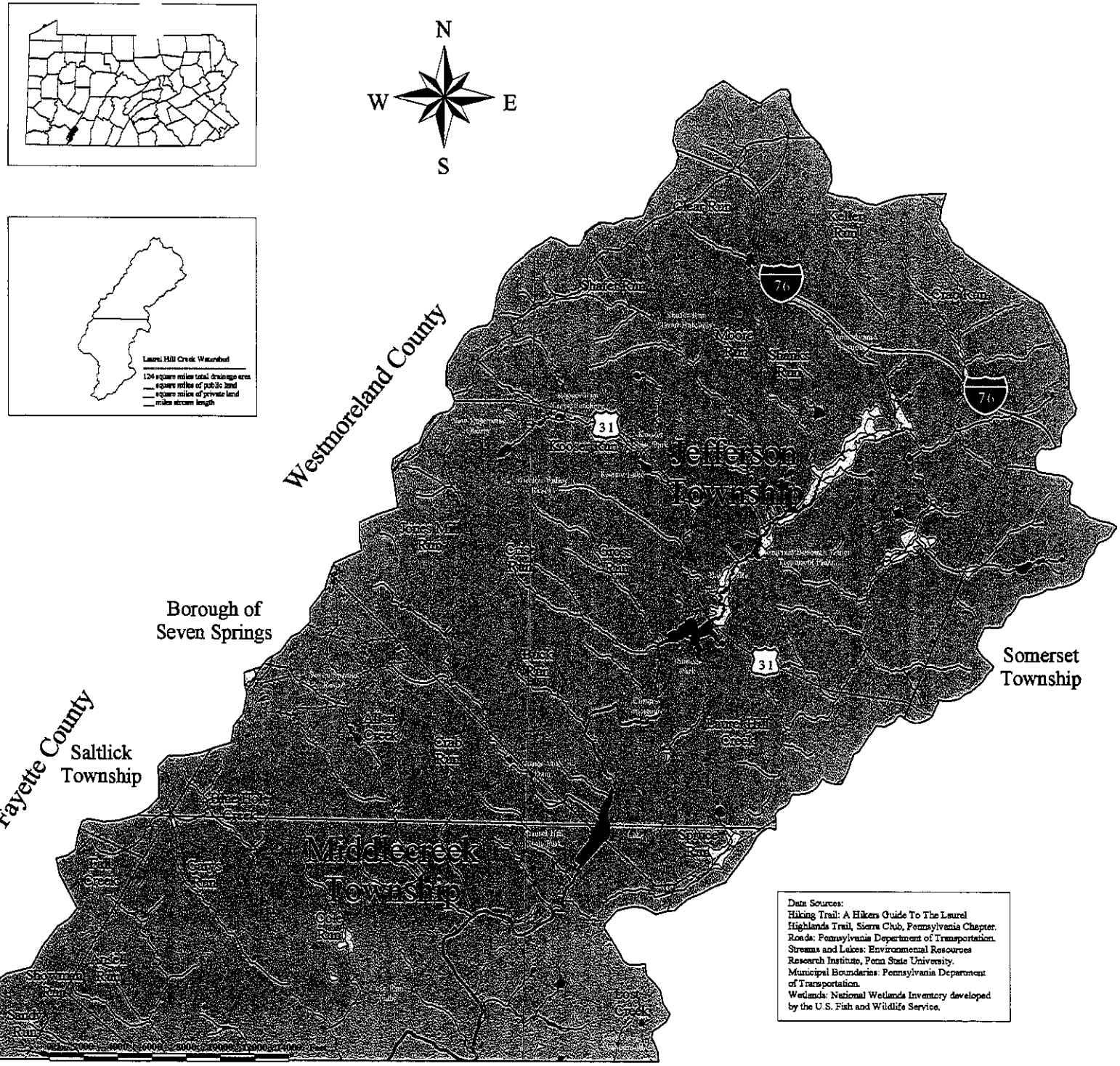

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 8N - Wetland Associations

- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Wetlands

- NWI Lacustrine Wetland
- NWI Palustrine Wetland
- Upland

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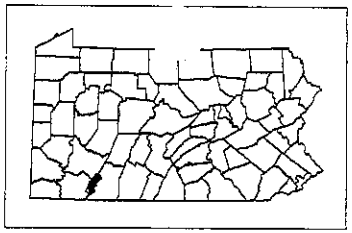

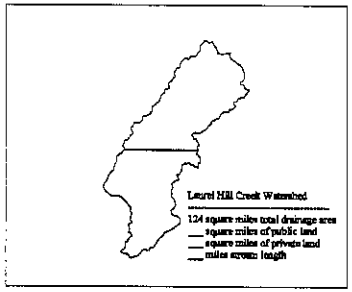

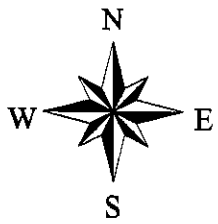

Blue Hole Creek

Fayette County

Springfield Township

Middlecreek Township

Stewart Township

Upper Turkeyfoot Township

Lower Turkeyfoot Township

Drake Run

Confluence Borough

Ursina Borough

281

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Wetlands: National Wetlands Inventory developed by the U.S. Fish and Wildlife Service.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 8S - Wetland Assocations

- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Wetlands

- NWI Lacustrine Wetland
- NWI Palustrine Wetland
- NWI Riverine Wetland
- Upland

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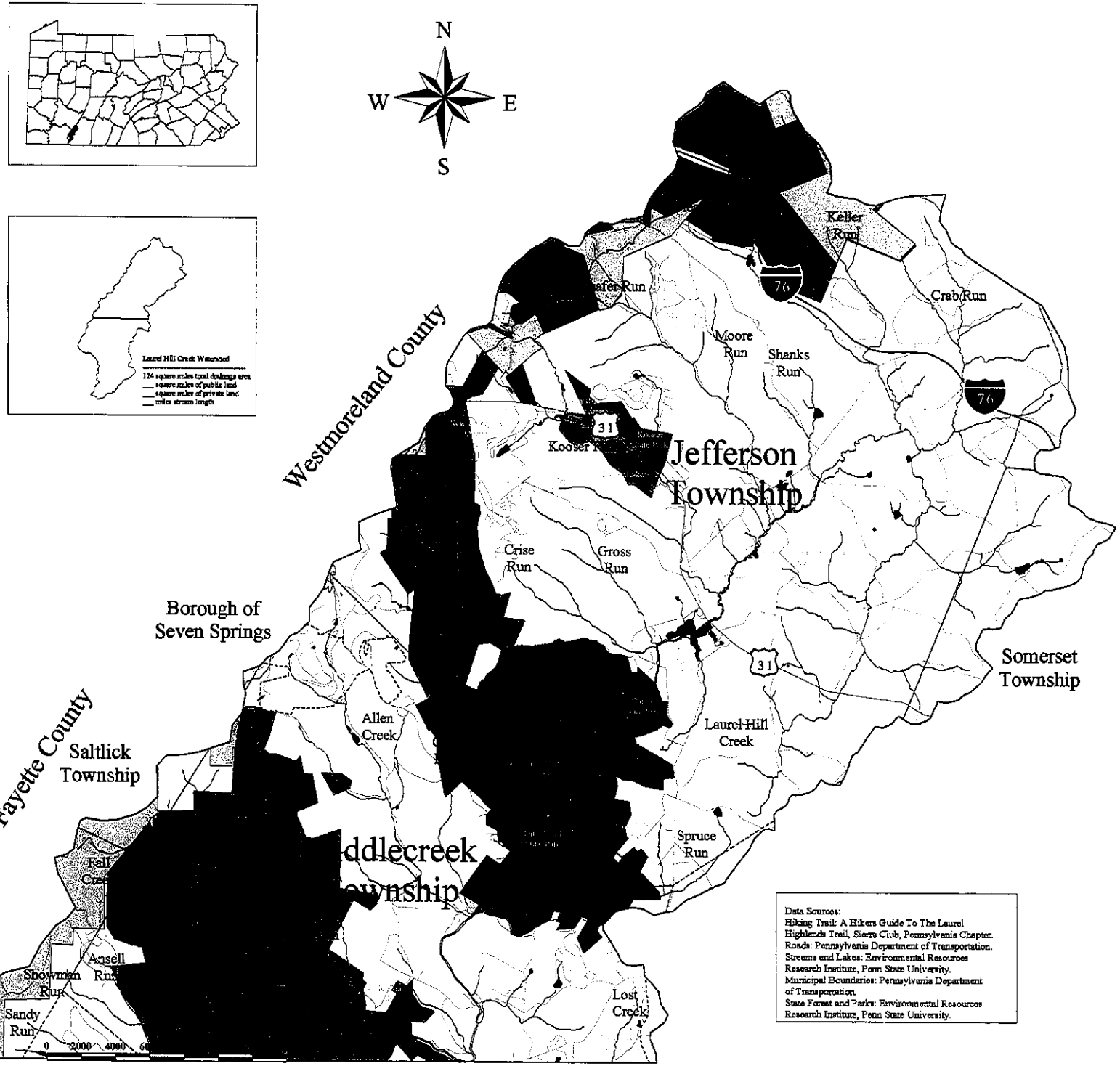

Data Sources:
Hiking Trail: A Hikers Guide To The Laurel Highlands Trail, Sierra Club, Pennsylvania Chapter.
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
State Forest and Parks: Environmental Resources Research Institute, Penn State University.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 9N - Recreational Areas

- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

State Parks
- KOOSER
- LAUREL HILL
- LAUREL RIDGE STATE PARK

State Forests
- FORBES STATE FOREST
- INHOLDING

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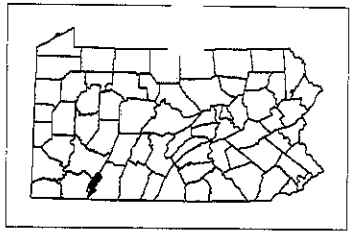

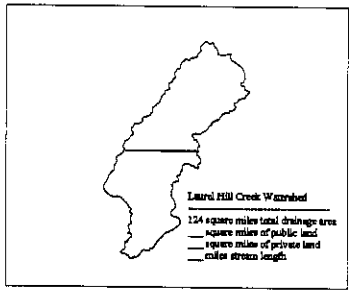

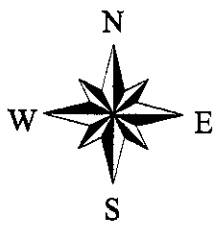

Blue Hole Creek
Fall Creek
Middlecreek Township
Lost Creek
Fayette County
Springfield Township
Sandy Run
Green King Run
Laurel Hill Creek
Whipkey Run
Harbaugh
Stewart Township
Upper Turkeyfoot Township
Mose King Run
Drake Run
281
Coke Oven Hollow
May Run
Smith Hollow
Lower Turkeyfoot Township
Paddytown Hollow
Laurel Hill Creek
Confluence Borough
Ursina Borough

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
State Forest, Gamelands, and Parks: Environmental Resources Research Institute, Penn State University.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 9S - Recreational Areas

- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

State Forests
- FORBES STATE FOREST
- INHOLDING

State Gamelands
- GAMELAND 111

State Parks
- LAUREL RIDGE STATE PARK

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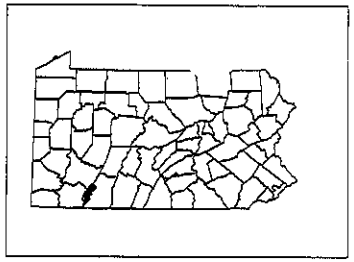

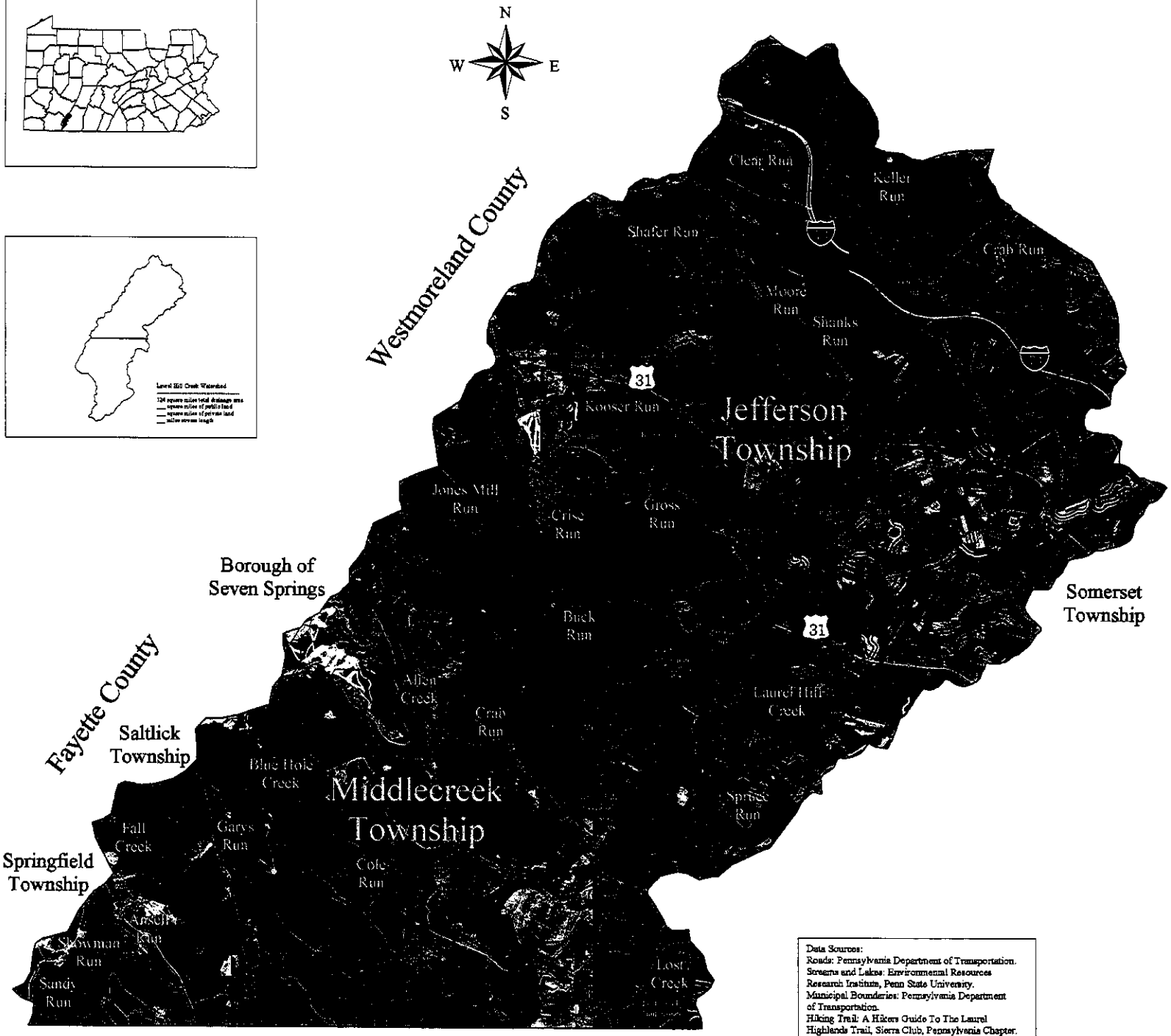

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 10N - Transportation Map

- **Laurel Highlands Hiking Trail**
- **Major Roads**
- **Minor Roads**
- **Other Roads**
- **Laurel Hill Creek Watershed**
- **Municipal Boundaries**
- **Streams**
- **Surface Water**
- **Digital Photo**

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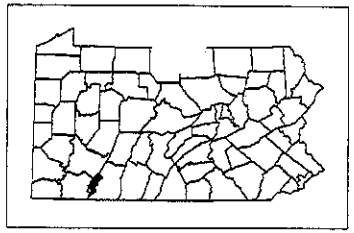
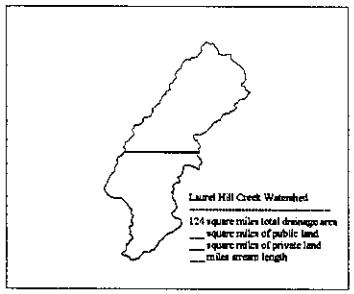
Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Hiking Trail: A Hikers Guide To The Laurel Highlands Trail, Sierra Club, Pennsylvania Chapter.
Digital Orthophoto: Somerset Conservation District.





Blue Hole Creek

Springfield Township

Fayette County

Middlecreek Township

Stewart Township

Upper Turkeyfoot Township

Drake Run

Lower Turkeyfoot Township

N

W E

S

Confluence Borough

Ursina Borough

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Active Railroad: Pennsylvania Department of Transportation.
Digital Orthophots: Somerset Conservation District.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 10S - Transportation

- Active railroads
- Minor roads
- Other roads
- Laurel Hill Creek Watershed
- Municipal boundaries
- Streams
- Surface Water
- Digital Photograph

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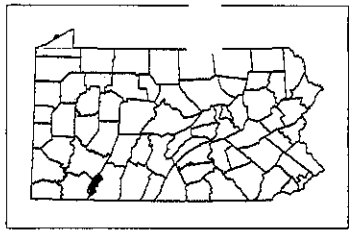

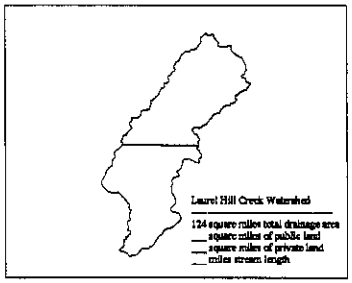

N
W E
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Shafer Run
Kooser Run
Westmoreland County
Jefferson Township
Somerset Township
Borough of Seven Springs
Fayette County
Saltlick Township
Springfield Township
Middlecreek Township
Buck Run
Allen Creek
Blue Hole Creek
Cole Run
Lost Creek
76
31

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Hiking Trail: A Hikers Guide To The Laurel Highlands Trail, Sierra Club, Pennsylvania Chapter.
Monitoring Locations: U.S. Department of the Interior Water Resource Data Pennsylvania Water Year 1984, Volume 3.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 11N - Monitoring Locations

- Monitoring locations
- USGS Monitoring Locations
- Laurel Highlands Hiking Trail
- Major Roads
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Watershed Basins
- UNNAMED - CRAB RUN (HQCWF)
- ALLEN CREEK (HQCWF)
- ANSELL RUN (HQCWF)
- BLUE HOLE CREEK (EV)
- BUCK RUN (HQCWF)
- CLEAR RUN (HQCWF)
- COLE RUN (EV)
- CRAB RUN (HQCWF)
- CRISE RUN (HQCWF)
- FALL CREEK (HQCWF)
- GARYS RUN (EV)
- GROSS RUN (HQCWF)
- JONES MILL RUN (EV)
- KELLER RUN (HQCWF)
- KOOSER RUN (HQCWF)
- LAUREL HILL CREEK (HQCWF)
- LOST CREEK (HQCWF)
- MOORE RUN (HQCWF)
- SANDY RUN (HQCWF)
- SHAFER RUN (HQCWF)
- SHANKS RUN (HQCWF)
- SHOWMAN RUN (HQCWF)
- SPRUCE RUN (HQCWF)

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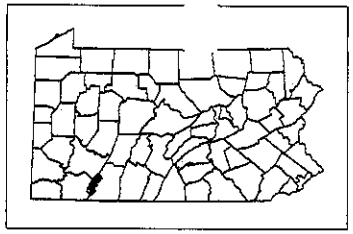

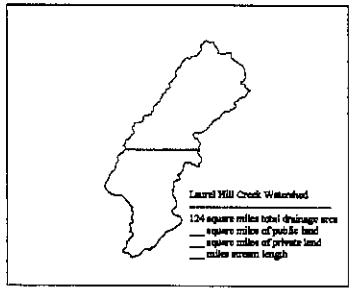

Blue Hole Creek

Fayette County

Springfield Township

Sandy Run

Stewart Township

Mose King Run

Drake Run

281

Paddytown Holow

Confluence Borough

Ursina Borough

N

W

E

S

Data Sources:
Roads: Pennsylvania Department of Transportation.
Streams and Lakes: Environmental Resources Research Institute, Penn State University.
Municipal Boundaries: Pennsylvania Department of Transportation.
Monitoring Locations: U.S. Department of the Interior Water Resource Data Pennsylvania Water Year 1984, Volume 3.

Laurel Hill Creek Watershed
Somerset County, PA

River Conservation Plan

Figure 11S - Monitoring Locations

- Monitoring locations
- USGS Monitoring Locations
- Minor Roads
- Other Roads
- Laurel Hill Creek Watershed
- Municipal Boundaries
- Streams
- Surface Water

Watershed Basins
- COKE OVEN HOLLOW (HQCWF)
- PADDYTOWN HOLLOW (HQCWF)
- SMITH HOLLOW (HQCWF)
- BLUE HOLE CREEK (EV)
- CLAY RUN (HQCWF)
- CRANBERRY GLADE RUN (HQCWF)
- DRAKE RUN (HQCWF)
- FALL CREEK (HQCWF)
- GREEN KING RUN (HQCWF)
- HARBAUGH RUN (HQCWF)
- LAUREL HILL CREEK (HQCWF)
- LOST CREEK (HQCWF)
- MAY RUN (HQCWF)
- MOSE KING RUN (HQCWF)
- SANDY RUN (HQCWF)
- WHIPKEY RUN (HQCWF)

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Appendix A

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Allen Creek	1 mi up	1	7.23	Neg	27.7	63.4	NA	238	1.05	NA	< 5
		3	6.8	NA	30	35.5	NA	111	1.22	0.3	107 (TS)
		2	7.15		25.5	53					
		5	7.17								
		6	7.0								
		7	7.0								
	US WWTP	8	6.1		34				0.84	0.04 (TP)	22
	D5 WWTP	8	6.0		26				1.4	0.27 (TP)	18
		9	7.2		29	60					
	Station 12	31	7.2	3.2	15.3	29.1					

macroinvertebrates	16 taxa collected on 7-23-76 (2); high density of invertebrates (4); 17 taxa collected in May 1991 and 24 taxa in Nov 1991 (6); 20 taxa were collected in May 1994 (7); 24 taxa collected at US WWTP and only 13 taxa were collected at DS WWTP, but 1.0 mile downstream of the WWTP discharge the total taxa collected was 27 (8)
trout	Naturally reproducing brook and brown trout population (2) & (7); brook (reproducing), brown (some reproduction), and rainbow trout found (4); reproducing brook trout pop. and some brown trout (6); naturally reproducing brook and brown trout, but the brown trout have varying year class strengths (9)
general synopsis of conditions	WQ Degradation believed to be caused by Seven Springs due to high BOD/organic enrichment from their WWTP (2)
management and restoration issues	

Data Sources:

1 Allen Creek: 6 samples taken from 1991 to 1994, various hydrologic conditions
Allen Creek: sampling station about 1 mile upstream from the confluence with Laurel Hill Creek
2 Allen Creek: Two sampling locations on 6-28-75 and 6-22-87, one 2.3 miles upstream of mouth and other at the mouth
6 Allen Creek: Sampling station located just downstream from WWTP
7 Allen Creek: Sampling station located just downstream from WWTP
8 Allen Creek: Sampling stations were located just upstream of the Seven Springs WWTP (US WWTP) and 0.5 miles downstream of the WWTP (DS WWTP)
9 Allen Creek: Sampling section extended from mouth upstream 3.7 km during June 1987
31 Allen Creek: Sampling station (station 12) located approx. 40 feet upstream of the lower bridge on L.R. 55172

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Ansell Run		5	4.73								

macroinvertebrates	
trout	No fish were found in the section surveyed, Al conc. of 0.50 mg/L (5)
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Blue Hole Creek	BH1	1	6.9	8.2	6.2	15.3	NA	36.6	0.34	NA	< 5
	BH2	1	5.9	5.5	8.2	17.4	NA	41.2	0.33	NA	6
		3	6.2	NA	10	12	NA	23	0.34	0.03 (TP)	26 (TS)
		2	6.68		5.5	13.3					
	NF	5	4.54								
	SF	5	5.66								
	BH1	6	6.5								
	BH2	6	6.5								
	BH1	7	6.63								
	BH2	7	6.5								
	BH1	10	6.7		5	8					
	BH2	10	6.8		7	15					
	Nov. 1983	28	6.4		10	14			0.23		
	Apr-84	28	6.6		8	16			0.14		
	Station 14	31	6.82	7.9	2.75	11.8					

macroinvertebrates	11 taxa collected on 3-2-77 (2); communities were stressed by intermittent acidification, having only acid-tolerant species (4); BH1 had 17 taxa collected and BH2 had 12 taxa collected in May 1991, BH1 had 26 taxa collected and BH2 had 18 taxa collected in Nov 1991 (6); BH1 has 13 taxa collected and BH2 had 14 taxa collected in May 1994 (7); 28 taxa collected in Nov. 1983 (28)
trout	Naturally reproducing brook trout population (2); reproducing brook trout pop. (4) & (6) & (7); brook trout at BH1 and BH2 (10)
general synopsis of conditions	Excellent water quality, however it has little assimilative capacity for pollution loading, due to low flows and minimal buffering capacity, no point sources (2)
management and restoration issues	Raparian areas are primarily public owned, helping to minimize non-point source pollution (2)

Data Sources:

2 Surveyed a section of the stream from Garys Run confluence to mouth on 3-2-77 and 6-10-86

1 Blue Hole Creek: 6 samples taken at each of two locations from 1991 to 1994, various hydrologic conditions

6 Blue Hole Creek: Station 1 (BH1) is located just downstream from the mouth of Gary's Run, station 2 (BH2) is located just Downstream from the mouth of Cole Run

7 Blue Hole Creek: Station 1 (BH1) is located just downstream from the mouth of Gary's Run, station 2 (BH2) is located just Downstream from the mouth of Cole Run

10 Blue Hole Creek: BH1 is located 320 m donstream of Garys Run, BH2 is located 250 m downstream of Cole Run

28 Blue Hole Creek: One sampling station in Nov. 1983 (low flow) and April 1984 (high flow)

31 Blue Hole Creek: Sampling station (station 14) located upstream approx. 100 feet from confluence with Fall Creek

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Buck Run		3	6.1	NA	14	18	NA	60	0.49	0.05 (TP)	48 (TS)
		2	6.1		1.5	35	51.35				
		5	6.74								

macroinvertebrates	Decrease in several species of macroinvertebrates that are sensitive to acid conditions and siltation; 14 taxa collected on 8-15-79 (2)
trout	From the headwaters to 1.4 miles upstream of the mouth, there is a naturally reproducing brook trout population, which is not successfully reproducing in the lower section (2)
general synopsis of conditions	Active Mining sites are impacting the stream, lowering pH and alkalinity and causing periodic pollution problems (2)
management and restoration issues	

Data Sources:

2 Buck Run: Four sampling locations in two sections on 8-15-79, section 1 is from the headwaters to 1.4 miles upstream of mouth and the other section continues from that location to Laurels Run at Rogers Mill

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Clear Run		3	6.3 (field)	NA	18	48	NA	245 (field)	0.38	0.04 (TP)	186 (TS)
		2	6.8		7.8	55.3					
		5	6.54								
		11			Low			High			
	Station 3	31	6.91	10.65	7.25	41.3					

macroinvertebrates	11 taxa collected on 7-20-77 (2); Invertebrate diversity was fair to poor compared to most headwater trout streams (11)
trout	Viable brook trout fishery (2); Wild brook trout collected, indicating a naturally reproducing pop. (11); reproducing trout pop. (14)
general synopsis of conditions	Upstream portion of the stream is impacted by salt runoff from the PA Turnpike (2); Impacted by human activities (highways, etc.) (5); High conductivity due to salt runoff from turnpike, low alkalinity so its susceptible to acidifcation (11)
management and restoration issues	

Data Sources:

2 Clear Run: Two sampling locations on 7-20-77, one at the headwaters and the other 3.6 miles downstream at the mouth

31 Clear Run: Sampling station (station 3) located approx. 25 feet upstream of bridge on L.R. (unknown #)

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Coke Oven Hollow											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Cole Run		1	4.33	15.3	0.8	7.2	NA	30.4	0.13	NA	< 5
		6	5.0								
		7	5.0								
		12	4.69			6.8		33.5	0.55	0.005 (DP)	

macroinvertebrates	14 taxa were collected in May 1991, 12 taxa were collected in Nov 1991 (6); 13 taxa collected in May 1994 (7)
trout	No fish found due to low pH and high Al levels (4); no fish were found due to low pH (6) & (7)
general synopsis of conditions	
management and restoration issues	

Data Sources:

1 Cole Run: 6 samples taken from 1991 to 1994, various hydrologic conditions
6 Cole Run: Sampling station located just upstream from the junction with Blue Hole Creek
7 Cole Run: Sampling station located just upstream from the junction with Blue Hole Creek
12 Data collected in May 1986

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Crab Run (near Allenville)	Station 2	31	7.13	4.2	19.7	40.9					

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

31 Crab Run: Sampling station (station 2) located upstream approx. 60 feet from L.R. 55147 by buried telephone cable

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Crab Run (near Barronvale)											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Cranberry Glade Lake		15	6.9		6.0	18		120			
		16	6.1-7.1		5.0-10.0						

macroinvertebrates	
trout	No trout found during surveys in 1979 (15), 1996 and 1997 (16)
general synopsis of conditions	
management and restoration issues	Liming the lake to increase pH and alkalinity levels (16)

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Cranberry Glade Run		3	5	NA	6	10	NA	25	0.3	0.04 (TP)	16 (TS)
		2	5.7		1	10					
		5	7.09								
	Station 22	31	7.23	5.8	9.5	24.4					

macroinvertebrates	
trout	Fish pop. believed to be impacted by human activities (highways, etc.), no brook trout collected (5)
general synopsis of conditions	Low pH and alkalinity, most of the raparian zone is public land (2)
management and restoration issues	

Data Sources:

2 Cranberry Glade Run: Two sampling locations on 5-31-84, within the section from Cranberry Glade Lake 3.7 miles downstream to the

31 Cranberry Glade Run: Sampling station (station 22) located just upstream of the confluence with Laurel Hill Creek

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Crise Run		3	4.2	NA	4	7	NA	58	0.1	0.05 (TP)	24 (TS)

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Fall Creek		3	6.2	NA	10	13	NA	23	0.3	0.03 (TP)	50 (TS)
		2	6.5		3	10.5					
		5	4.83								
	Station 15	31	6.67	9.4	2.46	12.6					

macroinvertebrates	
trout	Naturally reproducing brook trout population (2); No fish present (5)
general synopsis of conditions	Low pH and some siltation (2)
management and restoration issues	

Data Sources:

2 Fall Creek: Two sampling locations on 7-18-84 and 6-11-86, within the section from the confluence with Ansell Run 4.34 miles downstream to the mouth

31 Fall Creek: Sampling station (station 15) located just upstream of the confluence with Blue Hole Creek

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Garys Run											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Green King Run											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Gross Run		3	4.1	NA	2	6	NA	27	0.12	0.05 (TP)	22 (TS)
	Station 1	17	3.5	20	6		15.0	15			
	Station 2	17	3	36	0		16.0	25			

macroinvertebrates	Acid-resistant benthic communities present at both stations, with low diversity, primarily stoneflies collected (17)
trout	No fish found at either station, Al conc. near 0.50 mg/L (17)
general synopsis of conditions	Naturally acidic, not allowing for much aquatic life to exist
management and restoration issues	

Data Sources:

17 Gross Run: Two stations were sampled in August 1981, station 1 was at the headwaters and station 2 was at the mouth

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Harbaugh Run		2	6.5		7	16	67.46				
		18	6.5		7	9		27			

macroinvertebrates	13 taxa collected on 8-28-78 (2)
trout	Good population of brook and brown trout (2); found brook trout but was removed from the list of catchable trout waters following the 1978 survey that indicated poor access, poor habitat, and small size (18)
general synopsis of conditions	Receives heavy silt load from the drainage of Clairton Lake (2)
management and restoration issues	

Data Sources:

2 Harbaugh Run: One sampling location on 8-28-78, within a 1.67 mile section

18 Harbaugh Run: One sampling location in section 1 of the stream, which was a strech from the T-455 bridge downstream to the mouth, collected in June 1980

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Jones Mill Run		3	7.0	NA	28	27	NA	58	0.9	0.04 (TP)	58 (TS)
	8/18/1977	2	7.0		15	36	14.4	75			
	6/23/1983	2	6.6		13	24		75			
		1	7.33	Neg to 3	18-Jan	31.3	NA	63.2	0.94	NA	< 5
	NF	5	7.05								
	SF	5	6.95								
		6	7.5								
		7	7.13								
	Station 1	19	6.5		20	27	16.5	65	0.98		
	Station 2	19	6.5		22	29		70	1.27		
	Station 1	20	7.1		13	44		106			
	Station 2	20	7.0		15	51		90			
	Nov. 1983	28	6.5		10	15			0.21		
	Apr-84	28	6.4		8	10			0.13		
	Station 9	31	7.3	3.2	13.8	23.9					

macroinvertebrates	15 taxa collected on 6-23-83 (2); Healthy and diverse community, large # of mayflies (4); 26 taxa collected in May 1991, 30 taxa were collected in Nov 1991 (6); 28 taxa collected in May 1994 (7); good diversity and densities, with large numbers of stoneflies and caddisflies (19); 28 taxa collected in Nov. 1983 (28)
trout	Natural reproduction of brown, brook, and rainbow trout (2); reproducing brook trout pop. (4) & (6) & (7); abundant brook trout (5); reproducing trout pop. (14); naturally reproducing brook and brown trout populations (19); Survey found wild and hatchery brook trout at both stations, hatchery brown trout were found at both stations, while wild brown trout were only found at station 1 (20)
general synopsis of conditions	All of the raparian is public land with no development, good water quality, no permitted discharges (2); water chemistry shows little change between base flow and storm flow conditions (1); Clean, poorly buffered, moderately productive cold water fishery stream (19)
management and restoration issues	

Data Sources:

2 Jones Mill Run: Two sampling locations with one on 8-18-77 and one on 6-23-83, both within the section from the first bridge downstream from Becks Spring on Jones Mill Run Road 3.84 miles downstream to the mouth

1 Jones Mill Run: 6 samples taken from 1991 to 1994, various hydrologic conditions

6 Jones Mill Run: Sampling station was located one mile above mouth of Hemlock Run

7 Jones Mill Run: Sampling station was located one mile above mouth of Hemlock Run

19 Jones Mill Run: Two sampling stations in August 1984, with station 1 near the mouth and station 2 approx. halfway between the mouth and headwaters

20 Jones Mill Run: Two sampling stations in June 1998, same locations as the sites in the 1977 and 1983 PFBC surveys, station 1 is at RM 0.8 and station 2 is at RM 2.80

28 Jones Mill Run: One sampling station in Nov. 1983 (low flow) and April 1984 (high flow) at T364

31 Jones Mill Run: Sampling station (station 9) located at bridge on T-364

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Keller Run											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Kooser Run		3	6.3	NA	38	36	NA	90	0.94	0.07 (TP)	64 (TS)
		2	7.35		34.5	49.8					
		5	6.92								
	KR1	21	6.6	0	44	58	16.0	211	0.72	0.02 (TP)	
	KR2	21	6.8	0	42	62.2		221	0.64	0.02 (TP)	
	KR3	21	6.7	0	42	67.2		239	0.98	0.017 (TP)	
	KR4	21	6.8	0	42	62.5		221	0.92	0.02 (TP)	
	KR5	21	6.8	0	42	69.2		228	1.05	0.02 (TP)	
	02A	22	7.3		41	62					
	03A	22	7.3		36	50					
	03B	22	7.3		35	45					
	Station 6	31	7.3	1.7	20.6	33.6					

macroinvertebrates	14 taxa collected on 6-11-76 (2); moderately high diversity with nine families of mayfly, stonefly, and caddisfly found at sec. 02 and an avg of 8 families of mayfly, stonefly, and caddisfly found in sec. 03 (22)
trout	Stocked with brown, brook, and rainbow trout (2); no brook trout found (5); reproducing trout pop. (14); Sec. 02 did not seem to support natural trout reproduction, but supports a substantial stocked brook and brown trout fishery, while sec. 03 supports some natural reproduction of brown and brook trout, but is primarily sustained by stocking (22)
general synopsis of conditions	Major pollution problem is siltation from the Hidden Valley Ski Resort and the limestone quarry, trout hatchery effluent of concern (2); Impacted by human activities (5); Heavy siltation from Hidden Valley Ski Resort appears to impact trout reproduction in section 02 (22)
management and restoration issues	

Data Sources:

2 Kooser Run: Five sampling locations within two sections on 6-11-76 and June 18, 19, & 22 of 1987, within two sections, one extended from the lower to upper boundary of Kooser State Park (1.36 miles) and the other section the lower boundary of the state park to the confluence with Laurel Hill Creek (1.8 miles)

21 Kooser Run: Samples collected in August 1998 (KR1), September 1998 (KR2), October 1998 (KR3), November 1998 (KR4), and December 1998 (KR5) at the Kooser Run branch in the state park (Jefferson Twp.)

22 Kooser Run: Three sampling stations within two sections (Section 02 and 03), one station in section 02 was approx. 500 m upstream of Kooser Lake (02A), and the two stations in section 03 with one of the two 300 m upstream of the mouth (03A) and the other station 200-300 m further upstream (03B), performed in June 1987

31 Kooser Run: Sampling station (station 6) located approx. 150 feet upstream of the confluence with Laurel Hill Creek and directly adjacent to the Bakersville Community ?

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Laurel Hill Creek		3	6.7	NA	28.7	26.0	NA	96.7	0.32	0.07	87.3
		2	6.9		19	41	NA				
	LHC1	13	7.1	Neg	10.9	37	NA	142			
	LHC2	13	7.0	Neg	8.7	43	NA	150			
	LHC3	13	7.0	Neg	4.4	37	NA	145			
	LHC1 - LHC3	14	6.9-7.5		> 10						
	Section 01	27	7.3		16			113			
	Section 02	27	7.1		19	29		132			
	Section 03	27	7.8		20	31		158			
	Station 1 11/83	28	6.3		20	25			0.62		
	Station 1 4/84	28	6.4		15	18			0.31		
	Station 4 11/83	28	6.9		20	24			0.41		
	Station 4 4/84	28	6.7		16	20			0.32		
	Station 5 11/83	28	6.8		18	24			0.32		
	Station 5 4/84	28	6.3		15	20			0.24		
	Station 6 11/83	28	6.6		20	28			0.41		
	Station 6 4/84	28	6.7		15	22			0.50		
	Feb-85	29	5.95	2	10	27		150	1.27	0.05 (TP)	
	May-85	29	5.95	10	8	18		75	0.85	0.06 (TP)	
	Aug-85	29	7.0	8	14	20	20	70	0.54	0.03 (TP)	
	Nov-85	29	6.5	6	8	20		70	1.19	0.03 (TP)	
	Feb-87	29	7.2	6	10	29		180	1.18	0.02 (TP)	
	May-87	29	7.0	4	14	25		85	0.52	0.05 (TP)	
	Aug-87	29	7.1	0	24	35	17	125	0.24	0.02 (TP)	
	Nov-87	29	7.2	0	16	30		160	0.21	0.02 (TP)	
	May-92	30	6.01	2	11	44		102		0.01 (TP)	
	Jun-92	30	7.4	1	13	26		109		0.01 (TP)	
	Jul-92	30	7.57	1	19	33		117			
	Aug-92	30	8.21	3	11	29	18.7	83		0.47 (TP)	
	Sep-92	30	7.24	2	19	34		109		0.05 (TP)	
	Oct-92	30	7.3	4	24	38		121		0.017 (TP)	
	Station 1	31	7.26	1.17	35.25	50.75					
	Station 5	31	7.09	6.67	15.3	35.9					
	Station 7	31	7.08	2.83	16.9	35.5					
	Station 8	31	7.13	2.8	14.4	30.5					
	Station 10	31	7.1	3.2	12.9	28.5					
	Station 11	31	7.09	3.2	13.3	27.4					
	Station 13	31	7.18	3.2	12.9	26.5					
	Station 18	31	7.11	4	11.6	24.2					
	Station 20	31	7.09	4.8	11.4	23					
	Station 23	31	7.2	2.9	10.5	21.7					
	Station 24	31	7.2	3.6	11.5	24.9					
	Station 25	31	7.2	4.1	11.8	24.5					
	station 1	33	6.5	0	14.6						< 3
	station 2	33	6.4	0	13.4						< 3

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)

macroinvertebrates	20 taxa collected on 6-21-78 (2); LHC1 had 45 taxa collected, LHC2 had 50 taxa collected, and LHC3 had 31 total taxa collected (13); low relative abundances at all stations, with increased species diversity and densities at LHC1 compared to upstream stations, possibly due to sedimentation (14); Total taxa collected at each station in Nov. 1983: station 1 = 25, station 4 = 26, station 5 = 28, station 6 = 37 (28)
trout	Found brown trout at LHC1 and LHC3, seasonal coldwater fishery (stocked with trout) due to temperature fluctuations (13); found rainbow and brown trout (14); Brown trout collected at all 3 stations, rainbow trout collected at stations 01 and 03, and palamino trout collected at station 01 (27)
general synopsis of conditions	High quality water (2); Excellent water quality and a diverse and abundant fish population and benthic macroinvertebrate community (13): Upper Laurel Hill Creek water quality has improved from 1978 to 1994 based on PFBC surveys, but has concerns with sediment and animal waste loading (14)
management and restoration issues	

Data Sources:

2 Laurel Hill Creek: Eight sampling locations within four sections on 6-21-78, 6-22-78, and 8-9-78

13 Laurel Hill Creek: Three sampling stations, LHC1 was located at the T-495 bridge crossing, LHC2 was located about 0.06 miles downstream of the L.R. 55172 bridge crossing, immediately downstream of the Laurel Hill State Park WWTP, and LHC3 was located 0.19 miles upstream of the L.R. 55049 bridge crossing near Trent, sampled on 3-25-81

14 Laurel Hill Creek: Upper creek survey in Sept. 1998, used three stations over a ten mile section, LHC1 was located directly upstream of Laurel Hill Lake at RM 23.5, LHC2 was upstream of the Duck Pond Road bridge at RM 29, and LHC3 was upstream of the Laurel Run Road bridge at RM 33

27 Laurel Hill Creek: Two sampling stations in October 1992, one station in section 02 (RM 2.0) and one in section 03 (RM 0.04), one sampling station in June 1993 in section 01

28 Laurel Hill Creek: Four sampling stations on the creek in Nov. 1983 (low flow) and April 1984 (high flow), station 1 was along T495 below the lake and park WWTP, station 4 was at the end of T342, station 5 was at T393, and station 6 was at Ursina

29 Laurel Hill Creek: One sampling station at the bridge on PA RT. 281 - Lower Turkeyfoot Twp., 150 meters upstream of USGS gauging station at Ursina, 4.4 km upstream of mouth, collected in 1985 and 1987 (Feb, May, Aug, and Nov.)

30 Laurel Hill Creek: One sampling station at river mile 0.4 (near mouth/confluence with Casselman River) at the Rt. 281 bridge, data collected monthly from May through October 1992

31 Laurel Hill Creek: 12 sampling stations: Station 1 was directly downstream of bridge on T-583, Station 5 was at the Somerset Filtration Plant, Station 7 was at the Rt. 31 bridge, Station 8 was approx. 100 feet upstream of T-364 bridge, Station 10 was located below Laurel Hill Lake opposite office on T-364, Station 11 was under the bridge on L.R. 55172 below state park WWTP (north bank), Station 13 was approx. 100 feet upstream of Whipkey Bridge (?) on T-495 (east bank), Station 18 was just below Metzler settlement opposite JABE Hall Cabin on T-342 (west bank), Station 20 was just upstream of the confluence with Sandy Run, Station 23 was approx. 100 feet downstream of covered bridge on T-393 below Humbert (east bank), Station 24 was approx. 200 feet upstream of L.R. 55115 bridge in Ursina (north bank), and Station 25 was approx. 100 feet downstream of Rt. 281 bridge at confluence (south bank)

33 Two stations sampled to assess Maust Mine discharge (May Run) on 4-7-1997, station 1 was upstream of May Run confluence, and station 2 was downstream of May Run confluence , mine discharge, and mine waste piles

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Laurel Hill Lake											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Lost Creek	Station 16	31	7.22	3.2	16.3	28.6					

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

31 Lost Creek: Sampling station (station 16) located just above confluence with Laurel Hill Creek

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
May Run	station 1	32	6.4	0	14.4						< 3
	station 2	32	6.4	0	15.4						< 3
	station 3	32	6.5	0	14.4						< 3
	station 4	32	6.2	0	13.6						< 3

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

32 4 stations sampled to assess discharge of Maust mine (on 4-7-1997, station 1 was on the east branch of May Run on SGL#111 about 100 yds from LHC, station 2 was just upstream of station 1, station 3 was near confluence of May Run with LHC, and station 4 was on west branch of May Run about 25 yds from LHC on SGL #111

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Moore Run											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Mose King Run											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Paddytown Hollow											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Sandy Run		3	6.6	NA	10	7	NA	25	0.24	0.03 (TP)	24 (TS)
		2	5.8		2	8	62.06				
	NF	5	5.49								
	SF	5	4.62								
	01	23	5.9		1	7					
	02	23	6.3		2	7					
	Station 21	31	6.6	10.8	2.38	11.62					

macroinvertebrates	8 taxa collected on 8-4-77 (2); presence of several sensitive cold water *Plecoptera sp.* in moderate abundance at one station in section 03, but a scarcity of all taxa at a different station in section 03 due to the increased gradient and large boulders as the primary substrate (23)
trout	Naturally reproducing brook trout (2); No fish found on south fork, some brook trout found on the north fork (5); stable natural brook trout pop. of low density was found at both stations, also found brown and rainbow trout in the section (23)
general synopsis of conditions	Low pH and alkalinity are indicative of a low buffering capacity which makes it susceptible to rapid pH shifts (2); infertile water quality limits the standing crop of brook trout within this section (23)
management and restoration issues	

Data Sources:

2 Sandy Run: One sampling location on 8-4-77, within a 1.98 mile section from the PA 653 bridge downstream to 656 feet past the T-455

23 Sandy Run: Two sampling stations (01 and 02) within section 03 in July 1982, with the two stations totaling 510 m of the stream length and considered representative of the section

31 Sandy Run: Sampling station (station 21) located just upstream of confluence with Laurel Hill Creek

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Shafer Run		3	6.3	NA	30	28	NA	60	1.02	0.06 (TP)	32 (TS)
		2	7.13		21.8	39.3					
		5	6.96								
	1	24	7.3			30		80			
	1A	24	5.5			7		50			
	2	24	7			26		50			
	11/20/1995	26	6.9		18	22		104			
	6/26/2001	26	7.3		26	45		108			
	Station 4	31	7.29	5.8	14.4	23.4					

macroinvertebrates	19 taxa collected on 7-20-77 (2); 10 taxa at station 1 and 11 taxa at station 2 on 7-16-75 (24)
trout	Reproducing populations of brown and brook trout (2); collected brook trout (5); reproducing trout pop. (14); stocked with brook trout, also found brown and rainbow trout at station 1 (24); wild brook and brown trout populations exist (25); collected hatchery and wild brown trout and hatchery brook trout, wild brook trout were not collected in this section (02) since June 1987 (26)
general synopsis of conditions	Hatchery effluent and siltation from road runoff and lumbering are of concern (2)
management and restoration issues	

Data Sources:

2 Shafer Run: Two sampling locations with one section on 6-18-87 and 6-19-87, both within the section from the mouth upstream 2.6

24 Shafer Run: Three sampling stations, station 1 was the bridge on T-394 at intersection with T-633, station 1A was taken on the tributary at station 1, and station 2 was at the LR 55066 bridge, all of which were collected on 7-16-75

26 Shafer Run: One sampling station in section 02 at the second bridge upstream on T-633 (RM 2.0), with one event on 11-20-95 and another on 6-26-01

31 Shafer Run: Sampling station (station 4) located directly upstream from I.R. 55066 bridge

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Shanks Run											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Showman Run											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Smith Hollow											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Spruce Run		5	4.29								

macroinvertebrates	
trout	No fish found (5)
general synopsis of conditions	
management and restoration issues	

Data Sources:

Stream	Sampling Site	Data Source	pH	Acidity (mg/L)	Alkalinity (mg/L)	Hardness (mg/L as $CaCO_3$)	August Water Temperature (°F)	Conductivity (μmhos/ml)	NO_3 (mg/L)	PO_4 or Total P - TP (mg/L)	Total Suspended Solids (mg/L)
Whipkey Run											

NO DATA AVAILABLE

macroinvertebrates	
trout	
general synopsis of conditions	
management and restoration issues	

Data Sources:

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3	Beck, M. et al. 1975. The Laurel Hill Study, An Application of the Public Trust Doctrine to Pennsylvania Land-Use Planning in an Area of Critical State and Local Concern. Masters Thesis, University of Pennsylvania, Philadelphia, Pennsylvania USA.
1	Cassleberry, James R. P.G. 1994. Seven Springs Resort Surface Water Study; Analysis of Stream Flow, Water chemistry and Temperature Data Collected from August, 1991 through July, 1994. Cassleberry Associates.
6	Cooper, Edwin L. and William G. Kimmel PhD. 1991. Results of the Macroinvertebrate Sampling in May 1991. Stream Surveys for Seven Springs Resort Fayette, Westmoreland and Somerset Counties.
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2	Largent, K.L. 1989. A Compiled Streams Inventory and Water Quality Data Report of The Laurel Hill and Indian Creek Watersheds. Somerset Conservation District.
14	Mackin Engineering Company. 1999. Final Preliminary Watershed Assessment: Upper Laurel Hill Creek Watershed. Prepared for: Somerset Conservation District.
	Miko, D.A. & Lorson, R.D. 1994. Laurel Hill Creek (819E) Management Report. Pennsylvania Fish and Boat Commission, Bureau of Fisheries, Fisheries Management Division.
	Pennsylvania Department of Conservation and Natural Resources. 1977. Kooser State Park Resource Management Plan. Bureau of State Parks.
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	Pennsylvania Department of Environmental Protection. 2002 Commonwealth of Pennsylvania 2002 Water Quality Assessment- 305b Report. Bureau of Water.

CODE	Standard and Major Reports – Laurel Hill Creek Watershed
	Pennsylvania Department of Environmental Protection. 2002. Commonwealth of Pennsylvania 2002 List of Impaired Water Bodies- 303d Report. Bureau of Water.
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	United States Department of Agriculture Soil Conservation Service and Somerset Conservation District. 1987. Laurel Hill Creek Watershed Somerset County Pennsylvania Watershed Plan.
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	Reports by stream and sub-basin folder

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	Shaffer, Glen. June 23, 1954. Allen Creek, Tributary to Laurel Hill Creek Somerset County, Stream Investigation.
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	Cole Run
	William Lawrence III, Vice Chair, Sierra Club, Allegheny Group, Letter to Bureau of Dams and Waterways Management. 1990. Regarding Dam Application D56-122 Middle Creek Twp. Somerset County. June 5, 1990.
12	United States Environmental Protection Agency. 2003. STORET Data. http://oaspub.epa.gov/storpubl/lega/proc_generate_next
	Crab Run
	Crab Run II
	Cranberry Glade Run/Lake
15	Weirich, Boyer, Jugan, Forantas. 1979. Cranberry Glade Lake, Somerset County, PA (819E). Fisheries Management Report, Area 8 Division of Fisheries, Pennsylvania Fish Commission.
16	Lorson, Rick, and Gary Smith. 1997. Cranberry Glade Lake (819E) Management Report. PA Fish Commission Bureau of Fisheries, Fisheries Management Division.
	Crise Run
	Fall Creek
	Shaffer, Glenn June 22, 1954. Fall Creek, Tributary to Blue Hole Creek, Somerset County. United States Department of the Interior Geological Survey.
	Garys Run
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CODE	Standard and Major Reports – Laurel Hill Creek Watershed
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17	Kyle, Lynn. and Ronald Hughey, October 16, 1981. Stream File 7.12.4. Aquatic Biological Investigation Gross Run, Somerset County.
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18	Weirich, Boyer, Jugan. May 19, 1981. Harbaugh Run (819E) Management Report Section 02. Pennsylvania Fish Commission Bureau of Fisheries, Fisheries Management Division.
	Jones Mill Run
19	Weirich and Boyer. 1984. Jones Mill Run (819E) Management Report. PA Fish Commission Bureau of Fisheries, Fisheries Management Division.
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	Keller Run
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22	Weirich and Boyer . October 1989. Kooser Run (819E) Management Report Sections 02 and 03. PA Fish Commission Bureau of Fisheries, Fisheries Management Division.
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13	Pennsylvania Fish Commission. Fisheries Environmental Services. 1981. Aquatic Assessment, King Coal Company Middle Creek Township, Somerset County, Pennsylvania. Contract No. J5201922.
	Ging, Bob 2001. Letter to Thomas Vayansky, Regional Water Supply Manager. RE: Somerset Borough Water Withdrawls from Laurel Hill Creek.
29 & 30	United States Environmental Protection Agency. 2003. STORET Data. http://oaspub.epa.gov/storpubl/lega/proc_generate_next
28	Laurel Hill Creek Somerset County (November 1983) - Chemical and Biological Inventory of Laurel Hill Creek (and two tributaries)
	Boyer, Zyma, Smith. Spring 1982. Somerset Water Authority Dam (819E) Management Report. Pennsylvania Fish Commission Division of Fisheries, Fisheries Management Section.
33	Commonwealth of PA Dept. of Environmental Resources Bureau of Mining and Reclamation (1989). Surface Groundwater and Mine Drainage Analyses Laboratory Request and Submission Form for Samples Collected near the Datesman-Clinker Deep Mines Along Laurel Hill Creek.
	Lost Creek

CODE	Standard and Major Reports – Laurel Hill Creek Watershed
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32	Commonwealth of PA Dept. of Environmental Protection Bureau of Mining and Reclamation (1997). Sample Submission Sheet for Water Quality Laboratory Analyses of Samples Collected Near Maust Mine.
	Moore Run
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	Mose King Run
	Paddytown Hollow
	Sandy Run
23	Boyer, M. July, 1984. Sandy Run (819E) Management Report Section 03. Fisheries Management Section Area 8 Division of Fisheries, Pennsylvania Fish Commission.
	Shafer Run
24	Weirich, Boyer. 7/16/75. Shaffer Run Stream Survey Report Physical data . Pennsylvania Fish Commission Division of Fisheries.
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25	Shervinskie, T.A. and R.D. Lorson. 1991. Drought Impact Survey Report Isers Run (819F), Section 02, Shafer Run (819E), Section 02. Pennsylvania Fish and Boat Commission Bureau of Fisheries, Fisheries Management Division.
26	Smith, Gary and Rick Lorson 2001. Shafer Run (819E) Management Report Section 02 Brief. PA Fish and Boat Commission Bureau of Fisheries, Fisheries Management Division.
	Lorson, Rick 2001. E-mail to Tom Sambolt. Discussing water withdraws from Somerset borough resulting as a concern to Shafers Run.

CODE	Standard and Major Reports – Laurel Hill Creek Watershed
	Shanks Run
	Showman Run
	Smith Hollow
	Spruce Run
	Whipkey Run
	Other Data
	Correspondence between Bob Ging (LHC Watershed Association) and Rick Lorson (Southwest Region Area Fisheries Manager) 1993. Discussing silting issues.
	*** Letter from Mary Saylor, Clerk for Laurel Ridge State Park. 1988. Handwritten list of fish species found in Laurel Hill Lake and Laurel Hill Creek.
	Rough Draft- Laurel Hill Lake. Discusses: physical characteristics, fish history and sampling, geochemical aspects, and siltation.

Appendix B

SUBWATERSHED:	**Allen Creek**
STREAM:	**Allen Creek**
SAMPLING DATE:	**6/10/2003**
Benthics Data Summary:	
Sampling Location:	Triple Creek Acres
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	8 - Excellent
Habitat Assessment Data:	
Assessment Location:	Triple Creek Acres
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	High Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	15
Water Level to Stream Channel:	No Dry Bottom
Aquatic Vegetation:	None
Canopy Cover:	90%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	None
Sediment Substrate:	Cobble (45%), Gravel (40%), Sand (10%), Boulder (5%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent
Stream Flow Data:	
Sampling Location:	Triple Creek Acres
Stream Flow Conditions:	High Flow
Stream Width:	15'
Average Stream Depth:	1'
Stream Flow:	25.5 cfs
Percent of Laurel Hill Flow:	25.5/471*100 = 5.4%
Water Quality Data:	
Sampling Location:	Triple Creek Acres
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Water Depth at Sampling Point:	1'
Stream Substrate:	Cobble, Gravel, Sand, Boulder
Water Clarity:	Clear
pH:	6.6
Specific Conductivity:	198
Water Temperature:	62
Turbidity:	
Dissolved Oxygen (meter):	10.7
Dissolved Oxygen (kit):	12.5
Nitrate Range (kit):	0.25
Phosphate Range (kit):	0.5
Water Quality Assessment:	Good

Stream and/or Location =			Allen Creek					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	b	2	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	c	3	Damselfly nymphs		0	Leeches		0
Caddisflies	d	4	Cranefly larvae		0	Midge larvae	c	-1
Hellgramites		0	Crayfish		0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	8	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Blue Hole**
STREAM:	**Blue Hole Creek**
SAMPLING DATE:	**6/10/2003**
Benthics Data Summary:	
Sampling Location:	Upstream of Bridge (T-338)
Habitat Sampled:	Riffle
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	Large Slide Area on Right Bank
Benthic Stream Health Findings:	
EPT Test:	Failed
Sensitivity Score:	2 - Poor
Habitat Assessment Data:	
Assessment Location:	Upstream of Bridge (T-338)
Habitat Assessed:	Riffle
Stream Flow Conditions:	High Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	30
Water Level to Stream Channel:	No Bottom Dry
Aquatic Vegetation:	Attached Algae
Canopy Cover:	90%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Rare Unvegetated Areas
Sediment Substrate:	Gravel (40%), Cobble (30%), Boulder (20%), Sand (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent
Stream Flow Data:	
Sampling Location:	Upstream of Bridge (T-338)
Stream Flow Conditions:	High Flow
Stream Width:	30'
Average Stream Depth:	1'
Stream Flow:	63.6 cfs
Percent of Laurel Hill Flow:	63.6/471*100 = 13.5%
Water Quality Data:	
Sampling Location:	Upstream of Bridge (T-338)
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High
Water Depth at Sampling Point:	1'
Stream Substrate:	Gravel, Cobble, Boulders
Water Clarity:	Clear
pH:	6.8
Specific Conductivity:	27
Water Temperature:	62.8
Turbidity:	
Dissolved Oxygen (meter):	10.3
Dissolved Oxygen (kit):	9.5
Nitrate Range (kit):	0.25
Phosphate Range (kit):	0.5
Water Quality Assessment:	Excellent - Good

Stream and/or Location =			Blue Hole Creek					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies		0	Dragonfly nymphs		0	Aquatic worms		0
Mayflies		0	Damselfly nymphs		0	Leeches		0
Caddisflies	b	2	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	c	0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:	--	**Did Not Pass**
Sensitivity Score:	**2**	**Poor**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	Blue Hole Creek
STREAM:	Blue Hole Creek
SAMPLING DATE:	9/9/2003
Benthics Data Summary:	
Sampling Location:	at road crossing
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Sampling Equipment:	dip net kick method
Comments:	water clear
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	9 - Excellent
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	at road crossing
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	6 inches
Stream Substrate:	rock/cobble
Water Clarity:	clear
pH:	6.81
Specific Conductivity:	N.M.
Water Temperature:	16.0
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	N.M.
Ammonia:	N.M.
Water Quality Assessment:	Excellent

SUBWATERSHED:	**Clear Run**
STREAM:	**Clear Run**
SAMPLING DATE:	**6/9/2003**
Benthics Data Summary:	
Sampling Location:	Below Bakersville-Edie Road Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Failed
Sensitivity Score:	4 - Fair
Habitat Assessment Data:	
Assessment Location:	Below Bakersville-Edie Road Bridge
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	High Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	30
Water Level to Stream Channel:	No Dry Bottom
Aquatic Vegetation:	None
Canopy Cover:	50%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	None
Sediment Substrate:	Boulder (40%), Gravel (40%), Cobble (10%), Sand (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent-Good
Stream Flow Data:	
Sampling Location:	Below Bakersville-Edie Road Bridge
Stream Flow Conditions:	High Flow
Stream Width:	20'
Average Stream Depth:	0.67'
Stream Flow:	28.2 cfs
Percent of Laurel Hill Flow:	28.2/667*100=4.2%
Water Quality Data:	
Sampling Location:	Below Bakersville-Edie Road Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Water Depth at Sampling Point:	0.67'
Stream Substrate:	Gravel, Boulder, Cobble, Sand
Water Clarity:	Clear
pH:	6.81
Specific Conductivity:	233
Water Temperature:	63
Turbidity:	
Dissolved Oxygen (meter):	10.2
Dissolved Oxygen (kit):	13
Nitrate Range (kit):	0.25
Phosphate Range (kit):	0.5
Water Quality Assessment:	**Good-Fair

Stream and/or Location =	Clear Run							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies		0	Dragonfly nymphs	a	1	Aquatic worms	b	0
Mayflies		0	Damselfly nymphs		0	Leeches		0
Caddisflies	b	2	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	b	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:	--	**Did Not Pass**
Sensitivity Score:	4	**Fair**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Cole Run**
STREAM:	**Cole Run**
SAMPLING DATE:	**6/10/2003**
Benthics Data Summary:	
Sampling Location:	Downstream of Bridge (Forbes State Forest)
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	3 - Fair
Habitat Assessment Data:	
Assessment Location:	Downstream of Bridge (Forbes State Forest)
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	High
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	30
Water Level to Stream Channel:	No Bottom Dry
Aquatic Vegetation:	None
Canopy Cover:	90%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	None
Sediment Substrate:	Cobble (50%), Gravel (35%), Boulder (15%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent
Stream Flow Data:	
Sampling Location:	Downstream of Bridge (Forbes State Forest)
Stream Flow Conditions:	High
Stream Width:	15'
Average Stream Depth:	0.5'
Stream Flow:	4.3 cfs
Percent of Laurel Hill Flow:	4.3/471*100 = 0.9%
Water Quality Data:	
Sampling Location:	Downstream of Bridge (Forbes State Forest)
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High
Water Depth at Sampling Point:	0.5'
Stream Substrate:	Cobble
Water Clarity:	Clear
pH:	4.3
Specific Conductivity:	33
Water Temperature:	61.5
Turbidity:	
Dissolved Oxygen (meter):	8.9
Dissolved Oxygen (kit):	11
Nitrate Range (kit):	0
Phosphate Range (kit):	0.5
Water Quality Assessment:	Poor

Stream and/or Location =		Cole Run						
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies		0	Dragonfly nymphs		0	Aquatic worms		0
Mayflies		0	Damselfly nymphs		0	Leeches		0
Caddisflies	d	4	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	d	-1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	**3**	**Fair**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infreguent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	

Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	Cole Run
STREAM:	Cole Run
SAMPLING DATE:	9/9/2003
Benthics Data Summary:	
Sampling Location:	at road crossing
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Sampling Equipment:	dip net kick method
Comments:	water clear
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	6 - Good
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	at road crossing
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	3 inches
Stream Substrate:	rock/cobble
Water Clarity:	clear
pH:	4.76
Specific Conductivity:	N.M.
Water Temperature:	16.2
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	N.M.
Ammonia:	N.M.
Water Quality Assessment:	Poor

SUBWATERSHED:	**Cranberry Glade Run**
STREAM:	**Cranberry Glade Run**
SAMPLING DATE:	**7/2/2003**
Benthics Data Summary:	
Sampling Location:	1500' Downstream of A.7
Habitat Sampled:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	7 - Excellent
Habitat Assessment Data:	
Assessment Location:	1500' Downstream of A.7
Habitat Assessed:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	15
Water Level to Stream Channel:	25% - 50% Dry
Aquatic Vegetation:	None
Canopy Cover:	50%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Not Known
Sediment Substrate:	Boulder (10%), Cobble (40%), Gravel (30%), Sand (10%), Silt & Mud (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	1500' Downstream of A.7
Stream Flow Conditions:	Low Flow
Stream Width:	15'
Average Stream Depth:	1'
Stream Flow:	N/A
Percent of Laurel Hill Flow:	N/A
Water Quality Data:	
Sampling Location:	1500' Downstream of A.7
Habitat Sampled:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Water Depth at Sampling Point:	1'
Stream Substrate:	Cobble, Boulder, Gravel, Sand, Silt & Mud
Water Clarity:	Clear
pH:	6.8
Specific Conductivity:	
Water Temperature:	68
Turbidity:	
Dissolved Oxygen (meter):	6.8
Dissolved Oxygen (kit):	
Nitrate Range (strips):	2
Phosphate Range (strips):	5
Water Quality Assessment:	Good

Stream and/or Location =	Cranberry Glade Run							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies		0	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	b	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			
EPT Test:		**Excellent**						
Sensitivity Score:	7	**Excellent**						

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	Cranberry Glade Run
STREAM:	Cranberry Glade Run
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Downstream of lake outfall in a freshwater bog
Habitat Sampled:	
Stream Flow Conditions:	
Water Depth at Sampling Point:	
Stream Substrate:	
Water Clarity:	
pH:	4.51/4.46
Specific Conductivity:	N.M.
Water Temperature:	15.8
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.24/0.19 (colorimeter)
Ammonia:	N.M.
Water Quality Assessment:	Poor

SUBWATERSHED:	**Jones Mill Run**
STREAM:	**Jones Mill Run**
SAMPLING DATE:	**6/9/2003**
Benthics Data Summary:	
Sampling Location:	State Park Crossing
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	Log Weir Downstream of Reach
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	14 - Excellent
Habitat Assessment Data:	
Assessment Location:	State Park Crossing
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	High Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	17
Water Level to Stream Channel:	No Dry Bottom
Aquatic Vegetation:	None
Canopy Cover:	90%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Rare unvegetated areas
Sediment Substrate:	Boulder (5%), Cobble (80%), Gravel (10%), Sand (5%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent
Stream Flow Data:	
Sampling Location:	State Park Crossing
Stream Flow Conditions:	High Flow
Stream Width:	20'
Average Stream Depth:	1.17'
Stream Flow:	33.0 cfs
Percent of Laurel Hill Flow:	33/667*100 = 4.9%
Water Quality Data:	
Sampling Location:	State Park Crossing
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Water Depth at Sampling Point:	1.17'
Stream Substrate:	Cobble, Gravel, Boulder, Sand
Water Clarity:	Clear
pH:	5.9
Specific Conductivity:	122
Water Temperature:	63.5
Turbidity:	
Dissolved Oxygen (meter):	9.2
Dissolved Oxygen (kit):	13.5
Nitrate Range (kit):	0.25
Phosphate Range (kit):	0.5
Water Quality Assessment:	Good - Fair

Stream and/or Location =	Jones Mill Run							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	d	4	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	d	4	Damselfly nymphs		0	Leeches		0
Caddisflies	d	4	Cranefly larvae	a	1	Midge larvae		0
Hellgramites		0	Crayfish	c	0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams	a	1			

EPT Test:		**Excellent**
Sensitivity Score:	**14**	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Kooser Run**
STREAM:	**Kooser Run**
SAMPLING DATE:	**6/9/2003**
Benthics Data Summary:	
Sampling Location:	Upstream of Ponds
Habitat Sampled:	85% Riffle, 5% Run, 10% Pool
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	Sample Downstream of Quarry
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	9 - Excellent
Habitat Assessment Data:	
Assessment Location:	Upstream of Ponds
Habitat Assessed:	85% Riffle, 5% Run, 10% Pool
Stream Flow Conditions:	High Flow
Water Clarity:	Milky
Land Use:	Forest
Width to Depth Ratio:	20
Water Level to Stream Channel:	No Dry Bottom
Aquatic Vegetation:	None
Canopy Cover:	90%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Rare unvegetated areas
Sediment Substrate:	Boulder (10%), Cobble (50%), Gravel (30%), Sand (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent
Stream Flow Data:	
Sampling Location:	Upstream of Ponds
Stream Flow Conditions:	High Flow
Stream Width:	20'
Average Stream Depth:	1'
Stream Flow:	24.5 cfs
Percent of Laurel Hill Flow:	24.5/667*100 = 3.7%
Water Quality Data:	
Sampling Location:	Upstream of Ponds
Habitat Sampled:	Riffle
Stream Flow Conditions:	High Flow
Water Depth at Sampling Point:	1'
Stream Substrate:	Cobble, Gravel, Boulder, Sand
Water Clarity:	Milky
pH:	6.6
Specific Conductivity:	202
Water Temperature:	64
Turbidity:	
Dissolved Oxygen (meter):	10.2
Dissolved Oxygen (kit):	12.5
Nitrate Range (kit):	0.5
Phosphate Range (kit):	0.5
Water Quality Assessment:	Good - Fair

Stream and/or Location =			Kooser Run					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms	b	0
Mayflies	b	2	Damselfly nymphs		0	Leeches		0
Caddisflies	d	4	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish		0	Snails		0
.Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	9	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/24/2003**
Benthics Data Summary:	
Sampling Location:	A.0 Downstream of Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Sampling Equipment:	Kick Seine
Comments:	Livestock disturbed area upstream of sampling point
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	4 - Fair
Habitat Assessment Data:	
Assessment Location:	A.0 Downstream of Bridge
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	Normal
Water Clarity:	Slightly Cloudy
Land Use:	Row Crop Agriculture
Width to Depth Ratio:	37.5
Water Level to Stream Channel:	No Bottom Dry
Aquatic Vegetation:	Attached Algae
Canopy Cover:	0%
Riparian Buffer:	< 15', Grasses
Bank Stabilization:	Minor bank erosion
Sediment Substrate:	Cobble (40%), Gravel (10%), Silt and Mud (20%), Boulder (30%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	Sewage
Habitat Assessment Designation:	Fair
Stream Flow Data:	
Sampling Location:	A.0 Downstream of Bridge
Stream Flow Conditions:	Normal
Stream Width:	25'
Average Stream Depth:	0.67'
Stream Flow:	8.9 cfs
Percent of Laurel Hill Flow:	8.9/192*100 = 4.6%
Water Quality Data:	
Sampling Location:	A.0 Downstream of Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Water Depth at Sampling Point:	0.67'
Stream Substrate:	Cobble, Gravel, Boulder, Silt
Water Clarity:	Slightly Cloudy
pH:	6.4
Specific Conductivity:	158
Water Temperature:	70.8
Turbidity:	
Dissolved Oxygen (meter):	7.3
Dissolved Oxygen (kit):	10
Nitrate Range (kit):	2
Phosphate Range (kit):	1.5
Water Quality Assessment:	Fair

Stream and/or Location =	Laurel Hill Creek A.0							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	a	1	Damselfly nymphs		0	Leeches		0
Caddisflies		0	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	c	0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	**4**	**Fair**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	Laurel Hill Creek
STREAM:	Laurel Hill Creek
SAMPLING DATE:	9/9/2003
Benthics Data Summary:	
Sampling Location:	East crossing of Duck Pond Road (A.0)
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Sampling Equipment:	dip net kick method
Comments:	water clear/ green
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	6 - Good
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	East crossing of Duck Pond Road (A.0)
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	8 inches
Stream Substrate:	silt/rock/cobble
Water Clarity:	clear, slightly green
pH:	7.29
Specific Conductivity:	N.M.
Water Temperature:	19.7
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.03/0.01 (colorimeter)
Ammonia:	0.07/0.07 (colorimeter)
Water Quality Assessment:	Fair

SUBWATERSHED:	Laurel Hill Creek
STREAM:	Laurel Hill Creek
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Filtration plant reservoir
Habitat Sampled:	pool
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	8 inches
Stream Substrate:	
Water Clarity:	
pH:	7.40
Specific Conductivity:	N.M.
Water Temperature:	18.1
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.06/0.05 (colorimeter)
Ammonia:	0.02/0.00 (colorimeter)
Water Quality Assessment:	Good

SUBWATERSHED:	Laurel Hill Creek
STREAM:	Laurel Hill Creek
SAMPLING DATE:	9/9/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	First crossing of Laurel Run Road
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	
Stream Substrate:	
Water Clarity:	
pH:	7.17
Specific Conductivity:	N.M.
Water Temperature:	19.7
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.03/0.03 (colorimeter)
Ammonia:	0.05 (colorimeter)
Water Quality Assessment:	Fair

SUBWATERSHED:	Laurel Hill Creek
STREAM:	Laurel Hill Creek
SAMPLING DATE:	9/9/2003
Benthics Data Summary:	
Sampling Location:	West crossing of Duck Pond Road
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Sampling Equipment:	dip net kick method
Comments:	water clear
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	7 - Excellent
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	West crossing of Duck Pond Road
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	8 inches
Stream Substrate:	silt/sand/rock
Water Clarity:	clear, slightly green
pH:	7.33
Specific Conductivity:	N.M.
Water Temperature:	19.0
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.07/0.08 (colorimeter)
Ammonia:	0.03/0.02 (colorimeter)
Water Quality Assessment:	Good

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/23/2003**
Benthics Data Summary:	
Sampling Location:	A.3 100' Downstream of Jimtown Bridge
Habitat Sampled:	50% Run, 50% Pool
Stream Flow Conditions:	Normal
Sampling Equipment:	DIP-NET (20 Sweeps)
Comments:	Low Benthic Count
	Mainly Bivalvia
Benthic Stream Health Findings:	
EPT Test:	Failed
Sensitivity Score:	0 - Poor
Habitat Assessment Data:	
Assessment Location:	A.3 100' Downstream of Jimtown Bridge
Habitat Assessed:	50% Run, 50% Riffle
Stream Flow Conditions:	Normal
Water Clarity:	Slightly Cloudy
Land Use:	Field/Pasture
Width to Depth Ratio:	30
Water Level to Stream Channel:	
Aquatic Vegetation:	None
Canopy Cover:	10%
Riparian Buffer:	30' - 50', Trees
Bank Stabilization:	Rare unvegetated areas and moderate bank erosion
Sediment Substrate:	Sand (35%), Silt and Mud (35%), Gravel (10%), Cobble (10%), Boulder (10%)
Silts and Sands:	> 75%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Fair - Poor
Stream Flow Data:	
Sampling Location:	A.3 100' Downstream of Jimtown Bridge
Stream Flow Conditions:	Normal
Stream Width:	60'
Average Stream Depth:	2'
Stream Flow:	96.1 cfs
Percent of Laurel Hill Flow:	96.1/238*100 = 40.4%
Water Quality Data:	
Sampling Location:	A.3 100' Downstream of Jimtown Bridge
Habitat Sampled:	Pool
Stream Flow Conditions:	Normal
Water Depth at Sampling Point:	2'
Stream Substrate:	Sand, Silt, Gravel, Cobble, Boulder
Water Clarity:	Slightly Cloudy
pH:	6.5
Specific Conductivity:	154
Water Temperature:	69.6
Turbidity:	9.6
Dissolved Oxygen (meter):	9.6
Dissolved Oxygen (kit):	
Nitrate Range (kit):	0.5
Phosphate Range (kit):	0
Water Quality Assessment:	Good

Stream and/or Location =			Laurel Hill Creek A.3					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies		0	Dragonfly nymphs		0	Aquatic worms		0
Mayflies		0	Damselfly nymphs		0	Leeches		0
Caddisflies		0	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	c	0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams	c	0			

EPT Test:	**--**	**Did Not Pass**
Sensitivity Score:	**0**	**Poor**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	Laurel Hill Creek
STREAM:	Laurel Hill Creek
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	Jimtown Road Bridge (A.3)
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Sampling Equipment:	D-Frame Net - 4 sweeps
Comments:	water clear
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	11 - Excellent
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Jimtown Road Bridge (A.3)
Habitat Sampled:	pool
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	8 inches
Stream Substrate:	
Water Clarity:	clear
pH:	7.27
Specific Conductivity:	N.M.
Water Temperature:	15.9
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.12/0.08 (colorimeter)
Ammonia:	0.01/0.00 (colorimeter)
Water Quality Assessment:	Good - Fair

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/23/2003**
Benthics Data Summary:	
Sampling Location:	A.4 Downstream of Treatment Plant
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Above Average
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	8 - Excellent
Habitat Assessment Data:	
Assessment Location:	A.4 Below SR 3039 Crossing
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	Above Average
Water Clarity:	Slightly Cloudy
Land Use:	Forest
Width to Depth Ratio:	53.3
Water Level to Stream Channel:	No Streambed Dry
Aquatic Vegetation:	None
Canopy Cover:	80%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	None
Sediment Substrate:	Gravel (35%), Cobble (35%), Boulder (20%), Sand (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent - Good
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	N/A
Percent of Laurel Hill Flow:	N/A
Water Quality Data:	
Sampling Location:	A.4 Below SR 3039 Crossing
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Above Average
Water Depth at Sampling Point:	1.5'
Stream Substrate:	Gravel, Cobble, Boulder, Sand
Water Clarity:	Slightly Cloudy
pH:	6.5
Specific Conductivity:	131
Water Temperature:	70.4
Turbidity:	
Dissolved Oxygen (meter):	9.1
Dissolved Oxygen (kit):	0.4
Nitrate Range (strips):	2
Phosphate Range (kit):	0
Water Quality Assessment:	Good

Stream and/or Location =	Laurel Hill Creek A.4							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	a	1	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae		0	Midge larvae	b	0
Hellgramites		0	Crayfish	b	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams	c	0			
EPT Test:		**Excellent**						
Sensitivity Score:	**8**	**Excellent**						

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/24/2003**
Benthics Data Summary:	
Sampling Location:	A.4a Downstream of Allen Creek
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Sampling Equipment:	Kick Seine
Comments:	Strong Creosote Odor on Banks
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	4 - Fair
Habitat Assessment Data:	
Assessment Location:	A.4a Downstream of Allen Creek
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	Normal
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	80
Water Level to Stream Channel:	< 25% Dry
Aquatic Vegetation:	Attached Algae
Canopy Cover:	50%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	None
Sediment Substrate:	Cobble (40%), Gravel (20%), Boulder (30%), Sand (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	Petroleum
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	A.4a Downstream of Allen Creek
Stream Flow Conditions:	Normal
Stream Width:	80'
Average Stream Depth:	1'
Stream Flow:	135.0 cfs
Percent of Laurel Hill Flow:	135/192*100 = 70.3%
Water Quality Data:	
Sampling Location:	A.4a Downstream of Allen Creek
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Water Depth at Sampling Point:	1'
Stream Substrate:	Cobble, Boulder, Gravel, Sand
Water Clarity:	Clear
pH:	6.6
Specific Conductivity:	256
Water Temperature:	66.5
Turbidity:	
Dissolved Oxygen (meter):	9.7
Dissolved Oxygen (kit):	13
Nitrate Range (kit):	0.5
Phosphate Range (kit):	0
Water Quality Assessment:	Good

Stream and/or Location =			Laurel Hill Creek A.4a					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	a	1	Damselfly nymphs		0	Leeches		0
Caddisflies		0	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	c	0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams	c	0			

EPT Test:		**Excellent**
Sensitivity Score:	**4**	**Fair**
Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/24/2003**
Benthics Data Summary:	
Sampling Location:	A.5 Below Barronvale Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	7 - Excellent
Habitat Assessment Data:	
Assessment Location:	A.5 Below Barronvale Bridge
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	Normal
Water Clarity:	Slightly Cloudy
Land Use:	Forest
Width to Depth Ratio:	100
Water Level to Stream Channel:	< 25% Dry
Aquatic Vegetation:	None
Canopy Cover:	15%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Minor bank erosion
Sediment Substrate:	Cobble (30%), Gravel (30%), Sand (20%), Boulder (20%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	A.5 Below Barronvale Bridge
Stream Flow Conditions:	Normal
Stream Width:	100'
Average Stream Depth:	1'
Stream Flow:	165.8 cfs
Percent of Laurel Hill Flow:	165.8/192*100 = 86.3%
Water Quality Data:	
Sampling Location:	A.5 Below Barronvale Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Water Depth at Sampling Point:	1'
Stream Substrate:	Gravel, Cobble, Boulder, Sand
Water Clarity:	Slightly Cloudy
pH:	6.6
Specific Conductivity:	115
Water Temperature:	68.4
Turbidity:	
Dissolved Oxygen (meter):	7.4
Dissolved Oxygen (kit):	11.5
Nitrate Range (kit):	0.5
Phosphate Range (kit):	0
Water Quality Assessment:	Good

Stream and/or Location =	Laurel Hill Creek A.5							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	a	1	Damselfly nymphs		0	Leeches		0
Caddisflies	a	1	Cranefly larvae		0	Midge larvae	a	0
Hellgramites		0	Crayfish	b	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams	a	1			

EPT Test:		**Excellent**
Sensitivity Score:	7	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list

Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/12/2003**
Benthics Data Summary:	
Sampling Location:	A.5a Downstream of King's Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	8 - Excellent
Habitat Assessment Data:	
Assessment Location:	A.5a Downstream of King's Bridge
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	High
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	40
Water Level to Stream Channel:	No Dry Bed
Aquatic Vegetation:	Rooted Submerged
Canopy Cover:	5%
Riparian Buffer:	30' - 50', Trees
Bank Stabilization:	None
Sediment Substrate:	Cobble (50%), Boulder (30%), Gravel (15%), Sand (5%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	A.5a Downstream of King's Bridge
Stream Flow Conditions:	High Flow
Stream Width:	80'
Average Stream Depth:	2'
Stream Flow:	281.0 cfs
Percent of Laurel Hill Flow:	281/312*100 = 90.1%
Water Quality Data:	
Sampling Location:	A.5a Downstream of King's Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High
Water Depth at Sampling Point:	2'
Stream Substrate:	Cobble, Boulder, Gravel, Sand
Water Clarity:	Clear
pH:	6.8
Specific Conductivity:	102
Water Temperature:	69.2
Turbidity:	
Dissolved Oxygen (meter):	9.4
Dissolved Oxygen (kit):	11
Nitrate Range (kit):	1.5
Phosphate Range (kit):	0
Water Quality Assessment:	Good - Fair

Stream and/or Location =	Laurel Hill Creek A.5a							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	b	2	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	c	3	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae		0	Midge larvae	a	0
Hellgramites		0	Crayfish		0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	8	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	

Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/12/2003**
Benthics Data Summary:	
Sampling Location:	A.6 Bridge Downstream of Whipkey Dam
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Above Average
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	11 - Excellent
Habitat Assessment Data:	
Assessment Location:	A.6 Bridge Downstream of Whipkey Dam
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	Above Average
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	75
Water Level to Stream Channel:	No Streambed Dry
Aquatic Vegetation:	Rooted Submerged
Canopy Cover:	5%
Riparian Buffer:	30' - 50', Trees
Bank Stabilization:	Rare unvegetated areas
Sediment Substrate:	Cobble (75%), Boulder (15%), Gravel (5%), Sand (5%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	A.6 Bridge Downstream of Whipkey Dam
Stream Flow Conditions:	Above Average
Stream Width:	112'
Average Stream Depth:	1.5'
Stream Flow:	254.0 cfs
Percent of Laurel Hill Flow:	254/312*100 = 81.4%
Water Quality Data:	
Sampling Location:	A.6 Bridge Downstream of Whipkey Dam
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Above Average
Water Depth at Sampling Point:	1.5'
Stream Substrate:	Cobble, Boulder, Gravel, Sand
Water Clarity:	Clear
pH:	6.6
Specific Conductivity:	101
Water Temperature:	67.2
Turbidity:	
Dissolved Oxygen (meter):	9
Dissolved Oxygen (kit):	10
Nitrate Range (kit):	0.5
Phosphate Range (kit):	0
Water Quality Assessment:	Good

Stream and/or Location =	Laurel Hill Creek A.6							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	c	3	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae		0	Midge larvae	b	0
Hellgramites		0	Crayfish	b	1	Snails		0
Riffle Beetle		0	Hemiptera	a	1	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	**11**	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/24/2003**
Benthics Data Summary:	
Sampling Location:	A.7 Game Lands 111 Access
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	7 - Excellent
Habitat Assessment Data:	
Assessment Location:	A.7 Game Lands 111 Access
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	Normal
Water Clarity:	Slightly Cloudy
Land Use:	Forest
Width to Depth Ratio:	33
Water Level to Stream Channel:	
Aquatic Vegetation:	None
Canopy Cover:	30%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Rare unvegetated areas
Sediment Substrate:	Bedrock (20%), Boulder (30%), Cobble (30%), Gravel (10%), Sand (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	A.7 Game Lands 111 Access
Stream Flow Conditions:	Normal
Stream Width:	50'
Average Stream Depth:	1.5'
Stream Flow:	207.7 cfs
Percent of Laurel Hill Flow:	207.7/192*100 = 108.2%
Water Quality Data:	
Sampling Location:	A.7 Game Lands 111 Access
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Water Depth at Sampling Point:	1.5'
Stream Substrate:	Bedrock, Boulder, Cobble, Gravel, Sand
Water Clarity:	Slightly Cloudy
pH:	6.7
Specific Conductivity:	112
Water Temperature:	71.5
Turbidity:	
Dissolved Oxygen (meter):	8.7
Dissolved Oxygen (kit):	11
Nitrate Range (kit):	0.5
Phosphate Range (kit):	0.25
Water Quality Assessment:	Good

Stream and/or Location =			Laurel Hill Creek A.7					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	a	1	Damselfly nymphs		0	Leeches		0
Caddisflies	b	2	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	b	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	**7**	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list

Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/12/2003**
Benthics Data Summary:	
Sampling Location:	A.8 Below Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	10 - Excellent
Habitat Assessment Data:	
Assessment Location:	A.8 Below Bridge
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	High Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	45
Water Level to Stream Channel:	No Dry Bottom
Aquatic Vegetation:	Attached Algae
Canopy Cover:	5%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Minor bank erosion
Sediment Substrate:	Cobble (70%), Gravel (15%), Boulder (10%), Sand (2.5%), Silt (2.5%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	A.8 Above Bridge
Stream Flow Conditions:	High
Stream Width:	60'
Average Stream Depth:	1.33'
Stream Flow:	236.0 cfs
Percent of Laurel Hill Flow:	236/312*100 = 75.6%
Water Quality Data:	
Sampling Location:	A.8 Below Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High
Water Depth at Sampling Point:	1.33'
Stream Substrate:	Cobble, Boulder, Gravel
Water Clarity:	Clear
pH:	6.54
Specific Conductivity:	94
Water Temperature:	65.4
Turbidity:	
Dissolved Oxygen (meter):	10.7
Dissolved Oxygen (kit):	13.5
Nitrate Range (kit):	1.75
Phosphate Range (kit):	0.25
Water Quality Assessment:	Good - Fair

Stream and/or Location =	Laurel Hill Creek A.8							
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	c	3	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	a	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	**10**	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list

Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Laurel Hill Creek (Main Stem)**
STREAM:	**Laurel Hill Creek**
SAMPLING DATE:	**6/27/2003**
Benthics Data Summary:	
Sampling Location:	A.9 Below Lower Humbert Covered Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Normal
Sampling Equipment:	Kick Seine
Comments:	High Quantity of Benthics
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	12 - Excellent
Habitat Assessment Data:	
Assessment Location:	A.9 Below Lower Humbert Covered Bridge
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	Normal
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	100
Water Level to Stream Channel:	25% Dry
Aquatic Vegetation:	None
Canopy Cover:	10%
Riparian Buffer:	30' - 50', Trees
Bank Stabilization:	Rare Unvegetated Areas and minor bank erosion
Sediment Substrate:	Cobble (50%), Boulder (20%), Gravel (20%), Sand (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	A.9 Below Lower Humbert Covered Bridge
Stream Flow Conditions:	Average
Stream Width:	100'
Average Stream Depth:	1'
Stream Flow:	142.2 cfs
Percent of Laurel Hill Flow:	142.2/114*100 = 124.7%
Water Quality Data:	
Sampling Location:	A.9 Below Lower Humbert Covered Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	Average
Water Depth at Sampling Point:	1'
Stream Substrate:	Cobble, Boulder, Gravel, Sand
Water Clarity:	Clear
pH:	6.85
Specific Conductivity:	128
Water Temperature:	67.5
Turbidity:	
Dissolved Oxygen (meter):	8.5
Dissolved Oxygen (kit):	11.5
Nitrate Range (kit):	0.25
Phosphate Range (kit):	0.25
Water Quality Assessment:	Excellent - Good

Stream and/or Location =			Laurel Hill Creek A.9					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms	c	-1
Mayflies	d	4	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae	a	1	Midge larvae	a	0
Hellgramites		0	Crayfish	c	0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies	a	1	Fishfly larvae	a	1			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	**12**	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list

Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	Laurel Hill Creek
STREAM:	Laurel Hill Creek
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Upstream of Ursina bridge crossing
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	
Stream Substrate:	
Water Clarity:	
pH:	8.07
Specific Conductivity:	N.M.
Water Temperature:	21.3
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.11/0.10 (colorimeter)
Ammonia:	N.M.
Water Quality Assessment:	Fair

SUBWATERSHED:	**Lost Creek**
STREAM:	**Lost Creek**
SAMPLING DATE:	**7/2/2003**
Benthics Data Summary:	
Sampling Location:	Below Ream Road Bridge (downstream of Scottyland WWTP)
Habitat Sampled:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Failed
Sensitivity Score:	2 - Poor
Habitat Assessment Data:	
Assessment Location:	Below Ream Road Bridge (downstream of Scottyland WWTP)
Habitat Assessed:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	9
Water Level to Stream Channel:	< 25% Dry
Aquatic Vegetation:	Attached Algae
Canopy Cover:	90%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Moderate bank erosion
Sediment Substrate:	Boulder (40%), Cobble (30%), Gravel (20%), Sand (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	Below Ream Road Bridge (downstream of Scottyland WWTP)
Stream Flow Conditions:	Low Flow
Stream Width:	6'
Average Stream Depth:	0.67'
Stream Flow:	5.6 cfs
Percent of Laurel Hill Flow:	5.6/59*100 = 9.5%
Water Quality Data:	
Sampling Location:	Below Ream Road Bridge (downstream of Scottyland WWTP)
Habitat Sampled:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Water Depth at Sampling Point:	0.67'
Stream Substrate:	Gravel, Rock
Water Clarity:	Clear
pH:	6.9
Specific Conductivity:	123
Water Temperature:	70.5
Turbidity:	
Dissolved Oxygen (meter):	8.7
Dissolved Oxygen (kit):	11.5
Nitrate Range (strips):	2
Phosphate Range (kit):	0
Water Quality Assessment:	Excellent - Good

Stream and/or Location =			Lost Creek					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies		0	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	a	1	Damselfly nymphs		0	Leeches		0
Caddisflies		0	Cranefly larvae		0	Midge larvae	b	0
Hellgramites		0	Crayfish	b	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			
EPT Test:	--	**Did Not Pass**						
Sensitivity Score:	2	**Poor**						
Letter Codes:	blank	*= absent*						
	a	*= rare*						
	b	*= infrequent*						
	c	*= common*						
	d	*= abundant*						
	e	*= dominant*						
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list							
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*						
	Good	*If Sum of All Scores 5 to 6*						
	Fair	*If Sum of All Scores 3 to 4*						
	Poor	*If Sum of All Scores < 3*						

SUBWATERSHED:	Lost Creek
STREAM:	Lost Creek
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Covered Bridge Road crossing below (downstream) Scottyland outfall
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	4 inches
Stream Substrate:	rock/cobble
Water Clarity:	clear
pH:	7.63
Specific Conductivity:	N.M.
Water Temperature:	17.9
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.11/0.10 (colorimeter)
Ammonia:	N.M.
Water Quality Assessment:	Fair

SUBWATERSHED:	Lost Creek
STREAM:	Lost Creek
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Covered Bridge Road crossing at Scottyland outfall
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	4 inches
Stream Substrate:	rock/cobble
Water Clarity:	clear
pH:	7.13
Specific Conductivity:	N.M.
Water Temperature:	19.3
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	4.96/5.46 (colorimeter)
Ammonia:	N.M.
Water Quality Assessment:	Poor

SUBWATERSHED:	Lost Creek
STREAM:	Lost Creek
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Covered Bridge Road crossing upstream of Scottyland outfall
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	4 inches
Stream Substrate:	rock/cobble
Water Clarity:	clear
pH:	7.70
Specific Conductivity:	N.M.
Water Temperature:	17.9
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.15/0.15 (colorimeter)
Ammonia:	N.M.
Water Quality Assessment:	Fair

SUBWATERSHED:	Lost Creek
STREAM:	Lost Creek
SAMPLING DATE:	9/9/2003
Benthics Data Summary:	
Sampling Location:	Covered Bridge Road crossing upstream of Scottyland outfall
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Sampling Equipment:	dip net kick method
Comments:	water clear
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	11 - Excellent
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Covered Bridge Road crossing upstream of Scottyland outfall
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	4 inches
Stream Substrate:	rock/cobble
Water Clarity:	clear
pH:	7.60
Specific Conductivity:	N.M.
Water Temperature:	19.3
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.06/0.04 (colorimeter)
Ammonia:	0.02/0.02 (colorimeter)
Water Quality Assessment:	Good (slightly elevated pH)

SUBWATERSHED:	Lost Creek
STREAM:	Lost Creek
SAMPLING DATE:	9/9/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Covered Bridge Road crossing at Scottyland outfall
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	4 inches
Stream Substrate:	rock/cobble
Water Clarity:	clear
pH:	6.79
Specific Conductivity:	N.M.
Water Temperature:	19.5
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	4.76/5.68 (colorimeter)
Ammonia:	0.00/0.00 (colorimeter)
Water Quality Assessment:	Poor

Stream and/or Location = Lost Creek

Sensitive Taxa	Letter	Score	Somewhat Sensitive Taxa	Letter	Score	Tolerant Taxa	Letter	Score
Stoneflies	a	1	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	d	4	Damselfly nymphs		0	Leeches		0
Caddisflies	d	4	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	b	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae	b	1			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test: **Excellent**
Sensitivity Score: **11** **Excellent**

Letter Codes:
- blank = *absent*
- a = *rare*
- b = *infrequent*
- c = *common*
- d = *abundant*
- e = *dominant*

EPT Test: 3 Sensitive Taxa letters or any C, D, or E in sensitive list

Sensitivity Score:
- Excellent *If Sum of All Scores > 6*
- Good *If Sum of All Scores 5 to 6*
- Fair *If Sum of All Scores 3 to 4*
- Poor *If Sum of All Scores < 3*

SUBWATERSHED:	**Paddytown Hollow**
STREAM:	**Paddytown Hollow**
SAMPLING DATE:	**7/2/2003**
Benthics Data Summary:	
Sampling Location:	Downstream of Humbert Road Bridge
Habitat Sampled:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	6 - Good
Habitat Assessment Data:	
Assessment Location:	Downstream of Humbert Road Bridge
Habitat Assessed:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Water Clarity:	Slightly Cloudy
Land Use:	Forest
Width to Depth Ratio:	33
Water Level to Stream Channel:	25% - 50% Dry
Aquatic Vegetation:	Attached Algae
Canopy Cover:	50%
Riparian Buffer:	15' - 30', Trees
Bank Stabilization:	Rare unvegetated areas
Sediment Substrate:	Bedrock (10%), Boulder (30%), Cobble (30%), Gravel (20%), Silt & Mud (10%)
Silts and Sands:	25 - 50%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good - Fair
Stream Flow Data:	
Sampling Location:	Downstream of Humbert Road Bridge
Stream Flow Conditions:	Low Flow
Stream Width:	10'
Average Stream Depth:	0.33'
Stream Flow:	N/A
Percent of Laurel Hill Flow:	N/A
Water Quality Data:	
Sampling Location:	Downstream of Humbert Road Bridge
Habitat Sampled:	50% Riffle, 50% Pool
Stream Flow Conditions:	Low Flow
Water Depth at Sampling Point:	0.33'
Stream Substrate:	Silt, Gravel, Cobble, Boulder, Bedrock
Water Clarity:	Slightly Cloudy
pH:	6.8
Specific Conductivity:	14
Water Temperature:	68.6
Turbidity:	
Dissolved Oxygen (meter):	9.6
Dissolved Oxygen (kit):	9
Nitrate Range (strips):	3
Phosphate Range (kit):	< 1
Water Quality Assessment:	Good - Fair

Stream and/or Location =			Paddytown Hollow					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	a	1	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	a	1	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae	b	1	Midge larvae		0
Hellgramites		0	Crayfish		0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	**6**	**Good**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*

EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	Paddytown Hollow
STREAM:	Paddytown Hollow
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	
Habitat Sampled:	
Stream Flow Conditions:	
Sampling Equipment:	
Comments:	
Benthic Stream Health Findings:	
EPT Test:	
Sensitivity Score:	
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Bridge just before confluence with Laurel Hill Creek
Habitat Sampled:	
Stream Flow Conditions:	
Water Depth at Sampling Point:	
Stream Substrate:	
Water Clarity:	
pH:	7.69
Specific Conductivity:	N.M.
Water Temperature:	16.4
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.21/0.25 (colorimeter)
Ammonia:	N.M.
Water Quality Assessment:	Fair

SUBWATERSHED:	**Sandy Run**
STREAM:	**Sandy Run**
SAMPLING DATE:	**6/10/2003**
Benthics Data Summary:	
Sampling Location:	Downstream of Bridge (Sandy Run Road)
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	4 - Fair
Habitat Assessment Data:	
Assessment Location:	Downstream of Bridge (Sandy Run Road)
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	High Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	17
Water Level to Stream Channel:	No Dry Bottom
Aquatic Vegetation:	Attached Algae
Canopy Cover:	95%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Rare unvegetated areas
Sediment Substrate:	Cobble (50%), Boulder (40%), Gravel (10%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent - Good
Stream Flow Data:	
Sampling Location:	Downstream of Bridge (Sandy Run Road)
Stream Flow Conditions:	High Flow
Stream Width:	25'
Average Stream Depth:	1.5'
Stream Flow:	31.1 cfs
Percent of Laurel Hill Flow:	31.1/471*100 = 6.6%
Water Quality Data:	
Sampling Location:	Downstream of Bridge (Sandy Run Road)
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Water Depth at Sampling Point:	1.5'
Stream Substrate:	Cobble, Boulder, Gravel
Water Clarity:	Clear
pH:	6.8
Specific Conductivity:	42
Water Temperature:	66.7
Turbidity:	
Dissolved Oxygen (meter):	10.5
Dissolved Oxygen (kit):	11.5
Nitrate Range (kit):	0.25
Phosphate Range (kit):	0
Water Quality Assessment:	Excellent

Stream and/or Location =			Sandy Run					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies		0	Dragonfly nymphs		0	Aquatic worms		0
Mayflies		0	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	a	1	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	4	**Fair**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	Sandy Run
STREAM:	Sandy Run
SAMPLING DATE:	9/10/2003
Benthics Data Summary:	
Sampling Location:	Sandy Run Road
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Sampling Equipment:	D-Frame Net - 4 sweeps
Comments:	water clear
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	9 - Excellent
Habitat Assessment Data:	
Assessment Location:	
Habitat Assessed:	
Stream Flow Conditions:	
Water Clarity:	
Land Use:	
Width to Depth Ratio:	
Water Level to Stream Channel:	
Aquatic Vegetation:	
Canopy Cover:	
Riparian Buffer:	
Bank Stabilization:	
Sediment Substrate:	
Silts and Sands:	
Odors in Sediments or Water:	
Habitat Assessment Designation:	
Stream Flow Data:	
Sampling Location:	
Stream Flow Conditions:	
Stream Width:	
Average Stream Depth:	
Stream Flow:	
Percent of Laurel Hill Flow:	
Water Quality Data:	
Sampling Location:	Sandy Run Road
Habitat Sampled:	riffle
Stream Flow Conditions:	normal
Water Depth at Sampling Point:	4 inches
Stream Substrate:	
Water Clarity:	clear
pH:	5.94/5.98
Specific Conductivity:	N.M.
Water Temperature:	16.5/18.9
Turbidity:	N.M.
Dissolved Oxygen (meter):	N.M.
Dissolved Oxygen (kit):	N.M.
Nitrate:	N.M.
Phosphate:	0.06/0.04 (colorimeter)
Ammonia:	0.01/0.00 (colorimeter)
Water Quality Assessment:	Good - Fair

SUBWATERSHED:	**Shafer Run**
STREAM:	**Shafer Run**
SAMPLING DATE:	**6/9/2003**
Benthics Data Summary:	
Sampling Location:	Below Bakersville-Edie Road Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Sampling Equipment:	Kick Seine
Comments:	Rocks Appeared Red
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	8 - Excellent
Habitat Assessment Data:	
Assessment Location:	Below Bakersville-Edie Road Bridge
Habitat Assessed:	100% Riffle
Stream Flow Conditions:	High Flow
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	12
Water Level to Stream Channel:	No Dry Bottom
Aquatic Vegetation:	None
Canopy Cover:	90%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Rare unvegetated areas
Sediment Substrate:	Cobble (70%), Gravel (15%), Boulder (10%), Sand (5%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Excellent - Good
Stream Flow Data:	
Sampling Location:	Below Bakersville-Edie Road Bridge
Stream Flow Conditions:	High Flow
Stream Width:	15'
Average Stream Depth:	1.33'
Stream Flow:	36.3 cfs
Percent of Laurel Hill Flow:	36.3/667*100 = 5.4%
Water Quality Data:	
Sampling Location:	Below Bakersville-Edie Road Bridge
Habitat Sampled:	100% Riffle
Stream Flow Conditions:	High Flow
Water Depth at Sampling Point:	1.33'
Stream Substrate:	Cobble, Gravel, Boulder
Water Clarity:	Clear
pH:	6.6
Specific Conductivity:	53
Water Temperature:	62.4
Turbidity:	
Dissolved Oxygen (meter):	10
Dissolved Oxygen (kit):	12
Nitrate Range (kit):	0.25
Phosphate Range (kit):	0.5
Water Quality Assessment:	Good

Stream and/or Location =			Shafer Run					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	b	2	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	c	3	Damselfly nymphs		0	Leeches		0
Caddisflies	c	3	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish	c	0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	8	**Excellent**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

SUBWATERSHED:	**Whipkey Run**
STREAM:	**Whipkey Run**
SAMPLING DATE:	**6/10/2003**
Benthics Data Summary:	
Sampling Location:	Downstream of Green King Run Confluence
Habitat Sampled:	50% Riffle, 50% Pool
Stream Flow Conditions:	High
Sampling Equipment:	Kick Seine
Comments:	Difficult kicking due to large rocks
Benthic Stream Health Findings:	
EPT Test:	Excellent
Sensitivity Score:	5 - Good
Habitat Assessment Data:	
Assessment Location:	Downstream of Green King Run Confluence
Habitat Assessed:	50% Riffle, 50% Pool
Stream Flow Conditions:	High
Water Clarity:	Clear
Land Use:	Forest
Width to Depth Ratio:	13
Water Level to Stream Channel:	No Bottom Dry
Aquatic Vegetation:	Attached Algae
Canopy Cover:	90%
Riparian Buffer:	> 50', Trees
Bank Stabilization:	Rare unvegetated areas
Sediment Substrate:	Boulder (85%), Cobble (10%), Gravel (5%)
Silts and Sands:	0 - 25%
Odors in Sediments or Water:	None
Habitat Assessment Designation:	Good
Stream Flow Data:	
Sampling Location:	Downstream of Green King Run Confluence
Stream Flow Conditions:	High Flow
Stream Width:	20'
Average Stream Depth:	1.5'
Stream Flow:	13.8 cfs
Percent of Laurel Hill Flow:	13.8/471*100 = 2.9%
Water Quality Data:	
Sampling Location:	Downstream of Green King Run Confluence
Habitat Sampled:	50% Riffle, 50% Pool
Stream Flow Conditions:	High Flow
Water Depth at Sampling Point:	1.5'
Stream Substrate:	Boulder, Cobble, Gravel
Water Clarity:	Clear
pH:	6.8
Specific Conductivity:	40
Water Temperature:	63.7
Turbidity:	
Dissolved Oxygen (meter):	9.5
Dissolved Oxygen (kit):	11.5
Nitrate Range (kit):	0.25
Phosphate Range (kit):	0.25
Water Quality Assessment:	Excellent - Good

Stream and/or Location =			Whipkey Run					
Sensitive Taxa	*Letter*	*Score*	**Somewhat Sensitive Taxa**	*Letter*	*Score*	**Tolerant Taxa**	*Letter*	*Score*
Stoneflies	c	3	Dragonfly nymphs		0	Aquatic worms		0
Mayflies	a	1	Damselfly nymphs		0	Leeches		0
Caddisflies	a	1	Cranefly larvae		0	Midge larvae		0
Hellgramites		0	Crayfish		0	Snails		0
Riffle Beetle		0	Hemiptera		0	Blackfly larvae		0
Water Pennies		0	Fishfly larvae		0			
			Alderfly larvae		0			
			Sowbugs		0			
			Scuds		0			
			Clams		0			

EPT Test:		**Excellent**
Sensitivity Score:	5	**Good**

Letter Codes:	blank	*= absent*
	a	*= rare*
	b	*= infrequent*
	c	*= common*
	d	*= abundant*
	e	*= dominant*
EPT Test:	3 Sensitive Taxa letters or any C, D, or E in sensitive list	
Sensitivity Score:	Excellent	*If Sum of All Scores > 6*
	Good	*If Sum of All Scores 5 to 6*
	Fair	*If Sum of All Scores 3 to 4*
	Poor	*If Sum of All Scores < 3*

Appendix C

Subwatershed:	Allen Creek

Area (acres) of subwatershed:	2,909.1
Creek Name:	Allen Creek
Stream Length (miles):	5.04
Other Surface Waters:	6 unnamed first-order tributaries to Allen Creek, totaling 5.48 stream miles
Location:	Laurel Hill Creek tributaries to the SE, and Blue Hole Creek and Cole Run to the SW. South of the PA Turnpike.
Township:	Middle Creek
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	12.4
Other Urban Land (acres):	290.9
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	8.6
Deciduous Forest (acres):	2,597.3
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	Trout fishing
Hiking	Yes
Camping/ Other	Seven Springs Ski Resort: skiing, snowboarding, golf, hiking,

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	High BOD/organic enrichment from the Seven Springs WWTP is depressing the macroinvertebrate community; pH, alkalinity and total hardness are all elevated - likely due to the retaining ponds and sewage treatment plant[1]
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Good
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-10-03 Flow: 25.5 cfs / 5.4% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes; Good diversity, typically more than 20 taxa present
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	Fisheries and Habitat Assessment Data

Stream Health and Habitat Description:	contains naturally reproducing brook and brown trout populations; stream is stocked with trout[1]
2003 Sampling Results:	Sediment Substrate: Cobble (45%), Gravel (40%), Sand (10%), Boulder (5%)
	Silts and Sand: 0 - 25% / Bank Stabilization: None
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 90%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issue 1:	groundwater withdrawals for snowmaking[2]
Issue 2:	future groundwater withdrawals[2]
Issue 3:	BOD/organic enrichment from Seven Springs WWTP effluent[1]
Issue 4:	timber harvesting impacts on the stream[1]

Data Needs -	
Data Need 1:	current water quality data
Data Need 2:	current benthic macroinvertebrate data
Data Need 3:	instream flow needs for trout

[1] source: Largent (1989).

[2] source: Laurel Hill Creek Watershed Public Meetings, series 1 (2003).

Subwatershed:	Ansell Run

Area (acres) of subwatershed:	322.6
Creek Name:	Ansell Run
Creek Length (miles):	0.96
Other Surface Waters:	
Location:	In north half of watershed, on west border. Surrounded by the Fall Creek tributary to the north and Showman Run tributary to the south.South of the PA Turnpike.
Township:	Middle Creek, Springfield
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	240.1
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Minimal; Low pH and high levels of aluminum (0.50 mg/L)[1]
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No fish found in a survey, due to low pH and elevated aluminum concentrations[1]
Exotic Species Management Issues:	
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issue 1:	Low pH and high aluminum concentration, resulting in no fish

Data Needs -	
Data Need 1:	current water quality data and benthic data

[1] source: Sharpe et al (1987)

Subwatershed:	Blue Hole Creek

Area (acres) of subwatershed:	2,090.5
Creek Name:	Blue Hole Creek
Creek Length (miles):	4.78
Other Surface Waters:	Unnamed tributaries totaling 1.58 miles
Location:	In north half of watershed, on west border. Surrounded by the Allen Creek tributary to the NE, Cole Run and Laurel Hill Creek tributaries to the SE, Garys Run on west and Fall Creek to the SW. South of the PA Turnpike.
Township:	Middle Creek, Saltlick
Fishery Designation:	Exceptional Value Waters

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	1.6
Deciduous Forest (acres):	1,995.90
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	Yes
Hiking	
Camping/ Other	State Forest

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Excellent water quality, but has little assimilative capacity for pollution loading due to low flows and alkalinity; no point sources[1]; Low pH, alkalinity, and hardness
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Excellent - Excellent-Good
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-10-03 Flow: 63.6 cfs / 13.5% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes / Benthic communities were stressed by intermittent acidification, having only acid-tolerant species[2]
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	2 Monitoring Stations

Stream Health and Habitat Description:	Naturally reproducing brook trout pop.[1], partially impacted benthic community (pH)[2]
2003 Sampling Results:	Sediment Substrate: Gravel (40%), Cobble (30%), Boulder (20%), Sand (10%)
	Silts and Sands: 0 - 25% / Bank Stabilization: Rare Unvegetated Areas
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 90%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issue 1:	Low pH and alkalinity allows for significant shifts in pH, especially from rain events

Data Needs -	
Data Needs:	Additional water quality monitoring, specifically pH, alkalinity, and benthic macroinvertebrate data

[1] source: Largent (1989)

[2] source: Kimmel et al (1991 - 1993)

Subwatershed:	**Buck Run**

Area (acres) of subwatershed:	735.1
Creek Name:	Buck Run
Creek Length (miles):	1.25
Other Surface Waters:	
Location:	In north half of watershed, surrounded by tributaries on all sides. Crise Run to the N, Laurel Hill Creek tributary to the E and SE, and Jones Mill Run to the W and SW. South of the PA Turnpike.
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	701.6
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	Yes
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Low pH and alkalinity conditions are believed to be related to the geology of the region and the presence of some mining operations in this watershed, with some siltation problems as well[1]
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	Yes / Mainly found acid tolerant species, moderate diversity regarding number of taxa[1]
Stream Monitoring Status:	

Stream Health and Habitat Description:	While most of the data for this stream is old (1979), it was impacted by active mining sites and some siltation, but did have a naturally reproducing brook trout pop.[1]
Exotic Species Management Issues:	
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issue 1:	Low pH and alkalinity - No buffering capacity allowing for pH shifts and metal toxicity (if and when present)
Issue 2:	current status of trout reproduction

Data Needs -	
Data Need 1:	Current water quality and benthic data

[1] source: Largent (1989)

Subwatershed:	Clear Run

Area (acres) of subwatershed:	2,802.1
Creek Name:	Clear Run
Creek Length (miles):	4.88
Other Surface Waters:	Unnamed tributaries totaling 4.38 miles
Location:	Northernmost tributary to Laurel Hill Creek, above and below PA Turnpike
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	284.2
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	248.7
Strip Mines (acres):	
Surface Water (acres):	4.0
Deciduous Forest (acres):	2,287.7
Coniferous Forest (acres):	5.2
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping/ Other	State Forest

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Salt runoff from PA turnpike has impacted upper stream reaches, low pH and alkalinity promote large pH shifts[1]
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Good - Fair (elevated chlorides)
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-9-03 Flow: 28.2 cfs / 4.2% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes / Invertebrate diversity was fair to poor compared to most headwater trout streams[1]
2003 Sampling Results:	EPT Test: Failed / Sensitvity: Fair
Stream Monitoring Status:	

Stream Health and Habitat Description:	Naturally reproducing brook trout pop.[2]
2003 Sampling Results:	Sediment Substrate: Boulder (40%), Gravel (40%), Cobble (10%), Sand (10%)
	Silts and Sands: 0 - 25% / Bank Stabilization: None
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 50%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issue 1:	Runoff from PA turnpike

Data Needs -	
Data Need 1:	Current water quality data and benthic data

[1] source: Boyer et al (1987)

[2] source: Mackin (1999)

Subwatershed:	Coke Oven Hollow

Area (acres) of subwatershed:	1,058.7
Creek Name:	Coke Oven Hollow
Creek Length (miles):	3.02
Other Surface Waters:	Unnamed tributaries totaling 1.14 miles
Location:	In south half of watershed, surrounded by tributaries on all sides. Mose King Run to the N, Smith Hollow to the E and SE, May Run to the W and the Laurel Hill Creek tributary to the SW. South of the PA Turnpike.
Township:	Lower Turkeyfoot, Upper Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	336.3
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	722.3
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	Yes
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	

Data Needs -	
Data Need 1:	No data on water quality, water quantity, benthics, fish populations, or stream health

Subwatershed:	**Cole Run**

Area (acres) of subwatershed:	828.6
Creek Name:	Cole Run
Creek Length (miles):	2.42
Other Surface Waters:	
Location:	In north half of watershed, surrounded by tributaries on all sides. Blue Hole Creek to the W, Allen Creek to the NE, and the Laurel Hill Creek tributary to the SE. South of the PA Turnpike.
Township:	Middlecreek
Fishery Designation:	Exceptional Value Waters

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	828.5
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	No
Hiking	
Camping/ Other	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Low pH (4.0 - 5.0), high aluminum concentrations, low alkalinity, and low hardness levels allow for significant pH swings; geology of the region promotes the low pH and alkalinity conditions
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Poor (very low pH)
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-10-03 Flow: 4.3 cfs / 0.9% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes / 12 - 14 taxa collected in early 90's with mainly acid tolerant species present
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Good
Stream Monitoring Status:	

Stream Health and Habitat Description:	Poor conditions for trout, with no fish collected during any survey and only acid tolerant species of invertebrates
2003 Sampling Results:	Sediment Substrate: Cobble (50%), Gravel (35%), Boulder (15%)
	Silts and Sands: 0 - 25% / Bank Stabilization: None
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 90%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issue 1:	Low pH and elevated aluminum concentration
Issue 2:	restoration of fish/aquatic life

Data Needs -	
Data Need 1:	Additional water quality and current benthic macroinvertebrate data

Subwatershed:	Crab Run (near Allenvale)

Area (acres) of subwatershed:	3,036.8
Creek Name:	Crab Run
Creek Length (miles):	4.9
Other Surface Waters:	
Location:	NE most tributary bordering Keller Run to the West, to Laurel Hill Creek to the South and Clear Run to the SW. Both above and below PA Turnpike
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	1,688.50
Other Agricultural Land (acres):	
Residential (acres):	11.5
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	1,247.6
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	89.1
Natural Setting Description:	
Notable Land Features:[1]	
Notable Water Features:[2]	

Recreation Opportunities -	
Fishing	Yes
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No Data
Water Quantity Data/Impacts:	No Data
Benthic Macroinvertebrate Data:	No Data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No Data
Exotic Species Management Issues:	None Known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	
Issues:	
Issues:	
Issues:	
Issues:	
Issues:	

Data Needs -	
Data Need 1:	Water quality, water quantity, benthic, fish population or stream health data needed
Additional Data Needs:	
Additional Data Needs:	
Additional Data Needs:	
Additional Data Needs:	

[1] including noteworthy geologic formations or features, presence of prime farmland, land conservation easements, wildland areas, critical areas designation, land use specifics, extent of land development, any hazard areas (landfills, sinkholes, abandoned

[2] including creeks, springs, wetlands, ponds, lakes, reservoirs, dams, unique habitats, surface water withdrawals, groundwater withdrawals, surface water discharges

Subwatershed:	**Crab Run (near Barronvale)**

Area (acres) of subwatershed:	
Creek Name:	Crab Run
Creek Length (miles):	
Other Surface Waters:	
Location:	In North half of watershed, Surrounded by tributaries on all sides. Jones Mill Run is to the N, the Laurel Hill Creek Tributary is to the E, And Allen Creek borders along the W and SW.
Township:	Middlecreek
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Natural Setting Description:	
Notable Land Features:[1]	
Notable Water Features:[2]	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No Data
Water Quantity Data/Impacts:	No Data
Benthic Macroinvertebrate Data:	No Data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No Data
Exotic Species Management Issues:	None Known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	
Issues:	
Issues:	
Issues:	
Issues:	
Issues:	

Data Needs -	
Data Need 1:	Water quality, water quantity, benthic, fish population or stream health data needed
Additional Data Needs:	
Additional Data Needs:	
Additional Data Needs:	
Additional Data Needs:	

[1] including noteworthy geologic formations or features, presence of prime farmland, land conservation easements, wildland areas, critical areas designation, land use specifics, extent of land development, any hazard areas (landfills, sinkholes, abandoned

[2] including creeks, springs, wetlands, ponds, lakes, reservoirs, dams, unique habitats, surface water withdrawals, groundwater withdrawals, surface water discharges

Subwatershed:	**Cranberry Glade Run**

Area (acres) of subwatershed:	3,183.0
Creek Name:	Cranberry Glade Run
Creek Length (miles):	6.43
Other Surface Waters:	Unnamed tributaries totaling 5.75 miles
Location:	In south half of watershed, on west border surrounded by Harbaugh Run tributary to the N, Sandy Run to the NE, and Laurel Hill Creek along the S and SE.
Township:	Stewart, Upper Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	64.3
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	95.4
Deciduous Forest (acres):	2,832.7
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	Yes
Hiking	
Camping/ Other	State Game Land 111

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Low pH and alkalinity conditions (geology of the region) and heavy runoff potential from highways[1]
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Good - Poor (elevated nutrients and low pH)
Water Quantity Data/Impacts:	
Benthic Macroinvertebrate Data:	No historic data
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	

Stream Health and Habitat Description:	Fish pop. believed to be impacted by human activities (highway runoff, etc.)[2]
2003 Sampling Results:	Sediment Substrate: Cobble (40%), Gravel (30%), Sand, Silt, and Mud (20%), Boulder (10%)
	Silts and Sands: 0 - 25% / Bank Stabilization: Not known
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 50%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issue 1:	highway runoff
Issue 2:	fish commuity in the lake
Issue 3:	low pH and alkalinity conditions

Data Needs -	
Data Need 1:	Continued monitoring of water quality and benthic macroinvertebrate data

[1] source: Largent (1989)

[2] source: Sharpe et al (1987)

Subwatershed:	**Crise Run**

Area (acres) of subwatershed:	624.0
Creek Name:	Crise Run
Creek Length (miles):	1.99
Other Surface Waters:	Unnamed tributaries totaling 0.92 miles
Location:	In north half of watershed, surrounded by tributaries on all sides.Gross Run to the N, Laurel Hill Creek to the S, Jones Mill Run to the W, and Buck Run to the SW
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	623.9
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Very low pH and alkalinity conditions, believed to result from regional geology[1]
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	Water quality - low pH conditions caused by natural geology of the region

Data Needs -	
Data Need 1:	Current water quality, benthic, and fishery data

[1] source: Beck et al (1975)

Subwatershed:	Fall Creek

Area (acres) of subwatershed:	3,482.2
Creek Name:	Fall Creek
Creek Length (miles):	5.21
Other Surface Waters:	Unnamed tributaries totaling 4.89 miles
Location:	Split between the north and south half of the watershed on the west border. Surrounded to the E by Garys Run, SE by Blue Hole Run and Laurel Hill Creek. Fall Creek is bordered to the S by Green King Run, to the SW by Sandy Run, to the NW by Showman Run and Ansell Run
Township:	Springfield, Middlecreek
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	494.3
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	52.1
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	1.6
Deciduous Forest (acres):	2,430.60
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Low pH and alkalinity conditions (regional geology), some siltation issues[1]
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	Naturally reproducing brook trout pop.[1]
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issue 1:	Low pH and alkalinity - pH shifts may impact trout pop. or invertebrates

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

[1] source: Largent (1989)

Subwatershed:	Garys Run

Area (acres) of subwatershed:	781.1
Creek Name:	Garys Run
Creek Length (miles):	2.69
Other Surface Waters:	
Location:	In north half of watershed, on west border. Surrounded by Blue Hole Creek to the N, and Fall Creek tributary to the S. South of the PA Turnpike.
Township:	Saltlick, Middlecreek
Fishery Designation:	Exceptional Value Waters

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	736.9
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping/ Other	State Forest

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	
Additional Issues:	
Additional Issues:	
Additional Issues:	
Additional Issues:	
Additional Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data
Additional Data Needs:	
Additional Data Needs:	
Additional Data Needs:	
Additional Data Needs:	

Subwatershed:	**Green King Run**

Area (acres) of subwatershed:	1,095.5
Creek Name:	Green King Run
Creek Length (miles):	2.14
Other Surface Waters:	Unnamed tributaries totaling 1.56 miles
Location:	In south half of watershed, surrounded by tributaries on all sides. Fall Creek to the N, Laurel Hill Creek to the E, Sandy Run to the NW, and Whipkey Run to the S and SW.
Township:	Upperturkeyfoot, Middlecreek
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	257
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	838.4
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

Subwatershed:	Gross Run

Area (acres) of subwatershed:	785.8
Creek Name:	Gross Run
Creek Length (miles):	2.38
Other Surface Waters:	Unnamed tributaries totaling 0.53 miles
Location:	In north half of watershed, surrounded by tributaries on all sides. Kooser Run to the N and NW, Crise Run to the S, and Laurel Hill Creek to the E
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	785.7
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Very low pH (3.5 - 4.0) and alkalinity conditions, high aluminum concentration[3]
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	Yes / Low diversity, primarily stoneflies and acid-tolerant species[3]
Stream Monitoring Status:	

Stream Health and Habitat Description:	No fish found during survey in early 80's[3]
Exotic Species Management Issues:	
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issue 1:	Low pH and alkalinity - pH shifts and metals toxicity
Issue 2:	Fish and invertebrate communities
Additional Issues:	
Additional Issues:	
Additional Issues:	
Additional Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data
Additional Data Needs:	
Additional Data Needs:	
Additional Data Needs:	
Additional Data Needs:	

[1] including noteworthy geologic formations or features, presence of prime farmland, land conservation easements, wildland areas, critical areas designation, land use specifics, extent of land development, any hazard areas (landfills, sinkholes, abandoned

[2] including creeks, springs, wetlands, ponds, lakes, reservoirs, dams, unique habitats, surface water withdrawals, groundwater withdrawals, surface water discharges

[3] source: Kyle and Hughey (1981)

Subwatershed:	Harbaugh Run

Area (acres) of subwatershed:	1,631.6
Creek Name:	Harbaugh Run
Creek Length (miles):	2.75
Other Surface Waters:	Unnamed tributaries totaling 2.62 miles
Location:	In south half of watershed on west border, bordered by Sandy Run to the N and Cranberry Glade Run to the south
Township:	Springfield, Upper Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	221.3
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	7.7
Deciduous Forest (acres):	1,152.7
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping/ Other	State Game Land

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Heavy silt load entering from the drainage of Clairton lake[1]
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	Yes / 13 taxa collected in 1978 survey[1]
Stream Monitoring Status:	

Stream Health and Habitat Description:	Good brook and brown trout pop.[1]
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issue 1:	Silt loading from Clairton Lake

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

[1] source: Largent (1989)

Subwatershed:	**Jones Mill Run**

Area (acres) of subwatershed:	3,120.5
Creek Name:	Jones Mill Run
Creek Length (miles):	5.87
Other Surface Waters:	Unnamed tributaries totaling 3.92 miles
Location:	In north half of watershed, on west border. Surrounded by Kooser Run to the N and NE, Crise Run to the NE, and to the SE by Buck Run, Laurel Hill Creek, Laurel Hill Creek also borders on the SW along with Crab Run and Allen Run
Township:	Jefferson, Middlecreek
Fishery Designation:	Exceptional Value Waters

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	111.9
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	3.7
Deciduous Forest (acres):	2,987.4
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	Yes
Hiking	
Camping/ Other	State Forest

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Good water quality, no point sources, poorly buffered, moderately productive cold water fishery stream[1]
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Good - Fair (low pH and elevated phosphate)
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-9-03 Flow: 33 cfs / 4.9% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes / Healthy and diverse community[2]
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	

Stream Health and Habitat Description:	Wild and hatchery brown and brook trout exist[3]
2003 Sampling Results:	Sediment Substrate: Boulder (5%), Cobble (80%), Gravel (10%), Sand (5%)
	Silts and Sands: 0 - 25% / Bank Stabilization: Rare unvegetated areas
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 90%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issues:	Low pH and elevated phosphate levels

Data Needs -	Additional water quality monitoring, specifically pH and phosphates
Data Needs:	

[1] source: Weirich and Boyer (1984)

[2] source: Kimmel et al (1991-1993)

[3] source: Lorson and Smith (1998)

Subwatershed:	Keller Run

Area (acres) of subwatershed:	623.6
Creek Name:	Keller Run
Creek Length (miles):	1.97
Other Surface Waters:	Unnamed tributaries totaling 0.52 miles
Location:	Northern border of the watershed just east of Clear Run. The southern part of the tributary is intersected by the PA Turnpike
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	6.9
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	14.8
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	604
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping/ Other	State Forest

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

Subwatershed:	Kooser Run

Area (acres) of subwatershed:	2,939.5
Creek Name:	Kooser Run
Creek Length (miles):	4.97
Other Surface Waters:	Unnamed tributaries totaling 5.62 miles
Location:	In north half of watershed, on west border. Surrounded by Shaffer Run to the N, Laurel Hill Creek to the E, Gross Run to the S, and Jones Mill Run to the SW
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	88
Other Agricultural Land (acres):	36.4
Residential (acres):	27.3
Other Urban Land (acres):	141
Transportation and Utilities (acres):	
Strip Mines (acres):	48.2
Surface Water (acres):	17.1
Deciduous Forest (acres):	2,598.70
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	
Commercial and Services (acres):	14.4

Recreation Opportunities -	
Fishing	Yes/ Kooser State Park
Hiking	Yes/ Kooser State Park
Camping/Other	Yes/ Kooser State Park / Hidden Valley Ski Resort / State Forest

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	contribute significant silt loading, as well as a trout hatchery effluent that is a concern (nutrient loading)[1]
2003 Sampling Results:	Water Clarity: Milky / Water Chemistry: Good - Fair (elevated nutrients)
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-9-03 Flow: 24.5 cfs / 3.7% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes / Moderate diversity, with stone flies, caddisflies, and mayflies present[2]
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	

Stream Health and Habitat Description:	Trout reproduction impacted by the siltation problem, with some sections not having any natural reproduction of brown or brook trout (mainly stocked)[2]
2003 Sampling Results:	Sediment Substrate: Gravel (30%), Boulder (10%), Cobble (50%), Sand (10%)
	Silts and Sands: 0 - 25% / Bank Stabilization: Rare unvegetated areas
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 90%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issue 1:	Siltation from Hidden Valley Resort and limestone quarry
Issue 2:	Trout hatchery effluent

Data Needs -	
Data Needs:	Additional water quality monitoring near the sites of concern (resort, quarry, and hatchery)

[1] source: Largent (1989)

[2] source: Weirich and Boyer (1989)

Subwatershed:	Laurel Hill Creek

Area (acres) of subwatershed:	26,337.5
Creek Name:	Laurel Hill Creek
Creek Length (miles):	37.62
Other Surface Waters:	Unnamed tributaries totaling 66.42 miles
Location:	Runs from almost the top of the watershed to the bottom along the eastern border. It begins just south of Crab Run, Keller Run and Clear Run and ends as the southern most point near Ursina Borough
Township:	Jefferson, Somerset, Middlecreek, Upper Turkeyfoot and Lower Turkeyfoot.
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	10,641.4
Other Agricultural Land (acres):	
Residential (acres):	151.6
Other Urban Land (acres):	
Transportation and Utilities (acres):	0.1
Strip Mines (acres):	
Surface Water (acres):	135.3
Deciduous Forest (acres):	15,215.9
Coniferous Forest (acres):	
Mixed Forest (acres):	127.1
Transitional Areas (acres):	182.3

Recreation Opportunities -	
Fishing	Yes/ Laurel Hill State Park
Hiking	Yes/ Laurel Hill State Park
Camping/ Other	Yes/ Laurel Hill State Park, Camp Conestoga, Scottyland Camping Resort, / State Game Land

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Upper Laurel Hill Creek water quality has improved from 1978 to 1994 based on PFBC surveys, but has concerns with sediment and animal waste loading[1]; Overall the entire creek is of good quality, with possible concerns over low alkalinity levels in the lower creek
2003 Sampling Results:	
East Crossing of Duck Pond Road Bridge (A.0)	Water Clarity: Slightly Cloudy/Green / Water Chemistry: Fair (elevated nutrient levels)
West Crossing of Duck Pond Road Bridge	Water Clarity: Clear / Water Chemistry: Good
Downstream of Jimtown Road Countryman Bridge (A.3)	Water Clarity: Clear & Slightly Cloudy / Water Chemistry: Good - Good-Fair (elevated phosphates)
Downstream of State Park WWTP (A.4)	Water Clarity: Slightly Cloudy / Water Chemistry: Good
Downstream of Allen Creek (A.4a)	Water Clarity: Clear / Water Chemistry: Good
Below Barronvale Bridge (A.5)	Water Clarity: Slightly Cloudy / Water Chemistry: Good
Downstream of King's Bridge (A.5a)	Water Clarity: Clear / Water Chemistry: Good - Fair (elevated nitrates)
Below Bridge Downstream of Whipkey Dam (A.6)	Water Clarity: Clear / Water Chemistry: Good
Game Lands 111 Access (A.7)	Water Clarity: Slightly Cloudy / Water Chemistry: Good
Below Covered Bridge (A.8)	Water Clarity: Clear / Water Chemistry: Good - Fair (elevated nitrates)
Below Lower Humbert Covered Bridge (A.9)	Water Clarity: Clear / Water Chemistry: Excellent - Good
Water Quantity Data/Impacts:	
2003 Sampling Results:	
Downstream of Duck Pond Road Bridge (A.0)	6-24-03 Flow: 8.9 cfs / 4.6% of Ursina Flow
West Crossing of Duck Pond Road Bridge	N.A.
Downstream of Jimtown Road Countryman Bridge (A.3)	6-23-03 Flow: 96.1 cfs / 40.4% of Ursina Flow
Downstream of Allen Creek (A.4a)	6-24-03 Flow: 135 cfs / 70.3% of Ursina Flow
Below Barronvale Bridge (A.5)	6-24-03 Flow: 165.8 cfs / 86.3% of Ursina Flow
Downstream of King's Bridge (A.5a)	6-12-03 Flow: 281 cfs / 90.1% of Ursina Flow
Below Bridge Downstream of Whipkey Dam (A.6)	6-12-03 Flow: 254 cfs / 81.4% of Ursina Flow
Game Lands 111 Access (A.7)	6-24-03 Flow: 207.7 cfs / 108.2% of Ursina Flow
Below Covered Bridge (A.8)	6-12-03 Flow: 236 cfs / 75.6% of Ursina Flow
Below Lower Humbert Covered Bridge (A.9)	6-27-03 Flow: 142.2 cfs / 124.7% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes / low relative abundances at all stations, with increased species diversity and densities at downstream stations compared to upstream stations, possibly due to sedimentation[1]
2003 Sampling Results:	
Downstream of Duck Pond Road Bridge (A.0)	EPT Test: Excellent / Sensitivity: Good
West Crossing of Duck Pond Road Bridge	EPT Test: Excellent / Sensitvity: Excellent
Downstream of Jimtown Road Countryman Bridge (A.3)	EPT Test: Excellent / Sensitivity: Excellent
Downstream of State Park WWTP (A.4)	EPT Test: Excellent / Sensitvity: Excellent
Downstream of Allen Creek (A.4a)	EPT Test: Excellent / Sensitivity: Fair
Below Barronvale Bridge (A.5)	EPT Test: Excellent / Sensitivity: Excellent
Downstream of King's Bridge (A.5a)	EPT Test: Excellent / Sensitivity: Excellent
Below Bridge Downstream of Whipkey Dam (A.6)	EPT Test: Excellent / Sensitivity: Excellent
Game Lands 111 Access (A.7)	EPT Test: Excellent / Sensitivity: Excellent
Below Covered Bridge (A.8)	EPT Test: Excellent / Sensitivity: Excellent

Subwatershed:	Laurel Hill Creek
Below Lower Humbert Covered Bridge (A.9)	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	

Stream Health and Habitat Description:	Excellent water quality with a diverse and abundant fish population and benthic macroinvertebrate community[2]
2003 Sampling Results :	
Downstream of Duck Pond Road Bridge (A.0)	Sediment Substrate: Cobble (40%), Gravel (10%), Silt and Mud (20%), Boulder (30%) / Silts and Sands: 0 - 25% / Bank Stabilization: Minor bank erosion
West Crossing of Duck Pond Road Bridge	N.A.
Downstream of Jimtown Road Countryman Bridge (A.3)	(10%) / Silts and Sands: > 75% / Bank Stabilization: Rare unvegetated areas and moderate bank erosion
Downstream of State Park WWTP (A.4)	Sediment Substrate: Cobble (35%), Gravel (35%), Boulder (20%), Sand (10%) / Silts and Sands: 0 - 25% / Bank Stabilization: None
Downstream of Allen Creek (A.4a)	Sediment Substrate: Cobble (40%), Gravel (20%), Boulder (30%), Sand (10%) / Silts and Sands: 0 - 25% / Bank Stabilization: None
Below Barronvale Bridge (A.5)	Sediment Substrate: Cobble (30%), Gravel (30%), Boulder (20%), Sand (20%) / Silts and Sands: 0 - 25% / Bank Stabilization: Minor bank erosion
Downstream of King's Bridge (A.5a)	Sediment Substrate: Cobble (50%), Boulder (30%), Gravel (15%), Sand (5%) / Silts and Sands: 0 25% / Bank Stabilization: None
Below Bridge Downstream of Whipkey Dam (A.6)	Sediment Substrate: Cobble (70%), Boulder (10%), Gravel (10%), Sand (10%) / Silts and Sands: 0 - 25% / Bank Stabilization: Rare unvegetated areas
Game Lands 111 Access (A.7)	Sediment Substrate: Bedrock (20%), Boulder (30%), Cobble (30%), Gravel (10%), Sand (10%) / Silts and Sands: 0 - 25% / Bank Stabilization: Rare unvegetated areas and minor bank erosion
Below Covered Bridge (A.8)	Sediment Substrate: Cobble (70%), Gravel (15%), Boulder (10%), Sand and Silt (5%) / Silts and Sands: 0 - 25% / Bank Stabilization: Minor bank erosion
Below Lower Humbert Covered Bridge (A.9)	Sediment Substrate: Cobble (50%), Boulder (20%), Gravel (20%), Sand (10%) / Silts and Sands: 0 - 25% / Bank Stabilization: Rare unvegetated areas and minor bank erosion
Exotic Species Management Issues:	None Known - All Stations
Riparian Buffer Status:	
2003 Sampling Results :	
Downstream of Duck Pond Road Bridge (A.0)	Buffer: < 15' (grasses) / Canopy Cover: 0%
West Crossing of Duck Pond Road Bridge	N.A.
Downstream of Jimtown Road Countryman Bridge (A.3)	Buffer: 30 - 50' (trees) / Canopy Cover: 10%
Downstream of State Park WWTP (A.4)	Buffer: > 50' (trees) / Canopy Cover: 80%
Downstream of Allen Creek (A.4a)	Buffer: > 50' (trees) / Canopy Cover: 50%
Below Barronvale Bridge (A.5)	Buffer: > 50' (trees) / Canopy Cover: 15%
Downstream of King's Bridge (A.5a)	Buffer: 30 - 50' (trees) / Canopy Cover: 5%
Below Bridge Downstream of Whipkey Dam (A.6)	Buffer: 30 - 50' (trees) / Canopy Cover: 5%
Game Lands 111 Access (A.7)	Buffer: > 50' (trees) / Canopy Cover: 30%
Below Covered Bridge (A.8)	Buffer: > 50' (trees) / Canopy Cover: 5%
Below Lower Humbert Covered Bridge (A.9)	Buffer: 30 - 50' (trees) / Canopy Cover: 10%

Stream Fencing Status:	
2003 Sampling Results :	
Downstream of Duck Pond Road Bridge (A.0)	Potential
West Crossing of Duck Pond Road Bridge	None Needed
Downstream of Jimtown Road Countryman Bridge (A.3)	Potential
Downstream of State Park WWTP (A.4)	None Needed
Downstream of Allen Creek (A.4a)	None Needed
Below Barronvale Bridge (A.5)	None Needed
Downstream of King's Bridge (A.5a)	None Needed
Below Bridge Downstream of Whipkey Dam (A.6)	None Needed
Game Lands 111 Access (A.7)	None Needed
Below Covered Bridge (A.8)	None Needed
Below Lower Humbert Covered Bridge (A.9)	None Needed

Subwatershed Issues -	
Issue 1:	Sedimentation and elevated nutrient levels in upper reaches
Issue 2:	Lake water quality

Data Needs -	
Data Need 1:	Additional water quality and benthic macroinvertebrate monitoring in upper reaches and lake

[1] source: Mackin (1999)

[2] source: PFBC (1981)

Subwatershed:	Lost Creek

Area (acres) of subwatershed:	2,622.4
Creek Name:	Lost Creek
Creek Length (miles):	4.57
Other Surface Waters:	Unnamed tributaries totaling 5.25 miles
Location:	Split between the north and south half of the watershed on the east border. Surrounded to the NW by Spruce Run, and Laurel Hill Creek to the SW
Township:	Middlecreek
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	1,311.9
Other Agricultural Land (acres):	
Residential (acres):	25.6
Other Urban Land (acres):	26
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	30.3
Deciduous Forest (acres):	1,283.7
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	20.7

Recreation Opportunities -	
Fishing	
Hiking	
Camping	Yes / Camp Soles and Lost Creek Campground

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Minimal data (data from 1970's was used), low alkalinity[1]
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Excellent-Good - Poor (@ Scottyland WWTP outfall - high phosphates)
Water Quantity Data/Impacts:	
2003 Sampling Results:	7-2-03 Flow: 5.6 cfs / 9.5% of Ursina Flow
Benthic Macroinvertebrate Data:	No
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	

Stream Health and Habitat Description:	
2003 Sampling Results:	Sediment Substrate: Cobble (30%), Gravel (20%), Boulder (40%), Sand (10%)
	Silts and Sands: 0 - 25% / Bank Stabilization: Moderate bank erosion
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 90%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issues:	Water quality and aquatic life in the area near the Scottyland WWTP outfall

Data Needs -	
Data Need 1:	Additional water quality and benthic macroinvertebrate data at the outfall

[1] source: Cunningham (1978)

Subwatershed:	**May Run**

Area (acres) of subwatershed:	721.7
Creek Name:	May Run
Creek Length (miles):	1.63
Other Surface Waters:	Unnamed tributaries totaling 0.78 miles
Location:	In south half of watershed, surrounded by tributaries on all sides. Mose King Run to the N, Coke Oven Hollow to the E, and Laurel Hill Creek to the W and SW
Township:	Upper Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	23.8
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	0.7
Deciduous Forest (acres):	697.7
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping/ Other	State Game Lands

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Some pH, acidity, and alkalinity data indicating reduced pH and alkalinity conditions[1]
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No information on fish or benthic communities, just some water sampling for monitoring a deep mine site discharge to the creek (Maust Mine)[1]
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issue 1:	Historic mining impacts on water quality

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

[1] source: PA Bureau of Mining and Reclamation (1997)

Subwatershed:	**Moore Run**

Area (acres) of subwatershed:	430.0
Creek Name:	Moore Run
Creek Length (miles):	1.35
Other Surface Waters:	
Location:	In north half of watershed, surrounded by tributaries on all sides.Clear Run to the N, Shaffer Run to the E and S, and to the SE by Crab Run
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	429.9
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

Subwatershed:	Mose King Run

Area (acres) of subwatershed:	1,509.2
Creek Name:	Mose King Run
Creek Length (miles):	3.3
Other Surface Waters:	Unnamed tributaries totaling 0.86 miles
Location:	In south half of watershed, on east border. Surrounded by Laurel Hill Creek to the N and W, May Run to the SW and Coke Oven Hollow to the SE
Township:	Upper Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	313.9
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	1.7
Deciduous Forest (acres):	1,200.7
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

Subwatershed:	Paddytown Hollow

Area (acres) of subwatershed:	1,852.1
Creek Name:	Paddytown Hollow
Creek Length (miles):	4.14
Other Surface Waters:	Unnamed tributaries totaling 2.87 miles
Location:	In south half of watershed, on east border. Surrounded by Laurel Hill Creek to the S and SW, and by Smith Hollow to the NW
Township:	Upper Turkeyfoot, Lower Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	902.2
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	0.8
Deciduous Forest (acres):	978.8
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No historic data
2003 Sampling Results:	Water Clarity: Slightly Cloudy / Water Chemistry: Good-Fair - Fair (elevated nutrients)
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No historic data
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Good
Stream Monitoring Status:	

Stream Health and Habitat Description:	
2003 Sampling Results:	(10%)
	Silts and Sands: 25 - 50% / Bank Stabilization: Rare unvegetated areas
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: 15' - 30' (trees) / Canopy Cover: 50%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issues:	Elevated nutrient levels and limited buffer zone (15-30')

Data Needs -	
Data Need 1:	Additional nutrient/water quality data at different locations along the stream to identify potential sources

Subwatershed:	Sandy Run

Area (acres) of subwatershed:	5,144.2
Creek Name:	Sandy Run
Creek Length (miles):	7.07
Other Surface Waters:	Unnamed tributaries totaling 8.91 miles
Location:	Split between the north and south half of the watershed on the west border. Harbaugh Run also borders it to the W, Cranberry Glade Run to the SW, Laurel Hill Creek to the S and SE, to the NE of Laurel Hill Creek Sandy Run is bordered to the NE by Whipkey Run, Green King Run, Fall Creek Run, and by Showman Run at the very north tip.
Township:	Springfield, Upper Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	67.4
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	30.6
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	14.7
Deciduous Forest (acres):	4,300.3
Coniferous Forest (acres):	136.9
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	Yes/ Laurel Ridge State Park
Hiking	Yes/ Laurel Ridge State Park
Camping	Yes/ Laurel Ridge State Park

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Low pH, alkalinity, and hardness levels, due to regional geology, are indicative of poor assimilative capacity, allowing for significant pH swings[1]
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Excellent - Good-Fair (low pH)
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-10-03 Flow: 31.1 cfs / 6.6% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes / presence of several sensitive cold water *Plecoptera sp.* in moderate abundance at one station in a section of the creek, but a scarcity of all taxa at a different station in the same section due to the increased gradient and large boulders as the primary substrate[2]
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	

Stream Health and Habitat Description:	Stable natural brook trout pop. of low density was found at both stations, also found brown and rainbow trout in the section[2]
2003 Sampling Results:	Sediment Substrate: Cobble (50%), Boulder (40%), Gravel (10%)
	Silts and Sand: 0 - 25% / Bank Stabilization: Rare unvegetated areas
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 95%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issue 1:	Low pH and alkalinity levels

Data Needs -	
Data Need 1:	Additional water quality monitoring, specifically pH and alkalinity data

[1] source: Largent (1989)

[2] source: Boyer (1984)

Subwatershed:	**Shafer Run**

Area (acres) of subwatershed:	2,676.8
Creek Name:	Shafer Run
Creek Length (miles):	4.86
Other Surface Waters:	Unnamed tributaries totaling 4.68 miles
Location:	In north half of watershed, on west border. Surrounded to the NE by Clear Run, Moore Run, Crab Run and Laurel Hill Creek, Kooser Run borders the tributary to the S
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	93
Other Agricultural Land (acres):	
Residential (acres):	77.9
Other Urban Land (acres):	118.3
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	2,222
Coniferous Forest (acres):	164.6
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	Yes
Hiking	
Camping/ Other	State Forest

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Good water quality, but a hatchery effluent and siltation from road runoff and lumbering are a concern[1]
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Good
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-9-03 Flow: 36.3 cfs / 5.4% of Ursina Flow
Benthic Macroinvertebrate Data:	Yes / Low to moderate taxa numbers collected (surveys conducted in 1970's)[2]
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Excellent
Stream Monitoring Status:	

Stream Health and Habitat Description:	Wild and hatchery brown trout and hatchery brook trout are supported in this creek[3]
2003 Sampling Results:	Sediment Substrate: Cobble (70%), Gravel (15%), Boulder (10%), Sand (5%)
	Silts and Sands: 0 - 25% / Bank Stabilization: Rare unvegetated areas
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 90%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issue 1:	Fish hatchery effluent and road/highway runoff (siltation) issues
Issue 2:	Lumbering pressure

Data Needs -	
Data Need 1:	Continued monitoring of water quality and benthic data, especially near sites of concern (hatchery, road runoff, and lumbering locations)

[1] source: Largent (1989)

[2] sources: Weirich (1975) and Largent (1989)

[3] source: Smith and Lorson (2001)

Subwatershed:	Shanks Run

Area (acres) of subwatershed:	577.6
Creek Name:	Shanks Run
Creek Length (miles):	1.5
Other Surface Waters:	Unnamed tributaries totaling 1.33 miles
Location:	In north half of watershed, surrounded by tributaries on all sides. Clear Run is to the N, Moore Run to the (NW), Shafer Run to the SW, and Laurel Hill Creek bordering on the S and SE.
Township:	Jefferson
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	225.3
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	5.3
Deciduous Forest (acres):	352.2
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

Subwatershed:	**Showman Run**

Area (acres) of subwatershed:	408.2
Creek Name:	Showman Run
Creek Length (miles):	1.25
Other Surface Waters:	
Location:	In north half of watershed, on west border. Surrounded by the Ansell Run tributary to the north, Fall Creek to the E, and Sandy Run to the south
Township:	Middlecreek, Springfield
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	188.2
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

Subwatershed:	Smith Hollow

Area (acres) of subwatershed:	2,495.3
Creek Name:	Smith Hollow
Creek Length (miles):	4.05
Other Surface Waters:	Unnamed tributaries totaling 2.61 miles
Location:	In south half of watershed, on the east border. Surrounded by Paddytown Hollow to the SE, by Laurel Hill Creek to the SW, by Coke Oven Hollow to the west and to the north by Mose King Run along the N and W
Township:	Upper Turkeyfoot, Lower Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	561.9
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	1,952.10
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No data
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No data
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issues:	

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

Subwatershed:	**Spruce Run**

Area (acres) of subwatershed:	1,367.6
Creek Name:	Spruce Run
Creek Length (miles):	3.19
Other Surface Waters:	
Location:	In north half of watershed, on east border. Surrounded by Lost Creek at the very SE tip and Laurel Hill Creek along the N and W
Township:	Jefferson, Middlecreek
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	604.6
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	4.0
Deciduous Forest (acres):	646.7
Coniferous Forest (acres):	
Mixed Forest (acres):	
Transitional Areas (acres):	

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	Yes / Low pH (regional geology)[1]
Water Quantity Data/Impacts:	No data and flow not measured in 2003
Benthic Macroinvertebrate Data:	No data
Stream Monitoring Status:	

Stream Health and Habitat Description:	No fish found during survey in the mid 80's[1]
Exotic Species Management Issues:	None known
Riparian Buffer Status:	
Stream Fencing Status:	

Subwatershed Issues -	
Issue 1:	Fish community - does one exist?
Issue 2:	Low pH conditions - suitable for aquatic life?

Data Needs -	
Data Need 1:	Need water quality, water quantity, benthic, fish population, and stream health data

[1] source: Sharpe et al (1987)

Subwatershed:	Whipkey Run

Area (acres) of subwatershed:	536.2
Creek Name:	Whipkey Run
Creek Length (miles):	1.62
Other Surface Waters:	
Location:	In south half of watershed, Surrounded by tributaries on all sides. Sandy Run to the NE, Green King Run to the NE, and the Laurel Hill Creek tributary to the SW and SE
Township:	Upper Turkeyfoot
Fishery Designation:	High Quality - Cold Water Fishery

Land Use Information -	
Cropland and Pastureland (acres):	108.8
Other Agricultural Land (acres):	
Residential (acres):	
Other Urban Land (acres):	
Transportation and Utilities (acres):	
Strip Mines (acres):	
Surface Water (acres):	
Deciduous Forest (acres):	427.3
Coniferous Forest (acres):	98.1
Mixed Forest (acres):	18
Transitional Areas (acres):	22.3

Recreation Opportunities -	
Fishing	
Hiking	
Camping	

Historic and Archaeologic Features -	
Historic Features:	
Archaeologic Features:	

Water Quality Data / Impacts:	No historic data
2003 Sampling Results:	Water Clarity: Clear / Water Chemistry: Excellent - Good
Water Quantity Data/Impacts:	
2003 Sampling Results:	6-10-03 Flow: 13.8 cfs / 2.9% of Ursina Flow
Benthic Macroinvertebrate Data:	No historic data
2003 Sampling Results:	EPT Test: Excellent / Sensitivity: Good
Stream Monitoring Status:	

Stream Health and Habitat Description:	
2003 Sampling Results:	Sediment Substrate: Boulder (85%), Cobble (10%), Gravel (5%)
	Silts and Sands: 0 - 25% / Bank Stabilization: Rare unvegetated areas
Exotic Species Management Issues:	None known
Riparian Buffer Status:	Buffer: > 50' (trees) / Canopy Cover: 90%
Stream Fencing Status:	None needed

Subwatershed Issues -	
Issues:	Impact of significant boulder substrate habitat on aquatic life communities

Data Needs -	
Data Need 1:	Additional water quality and benthic macroinvertebrate data

Appendix D

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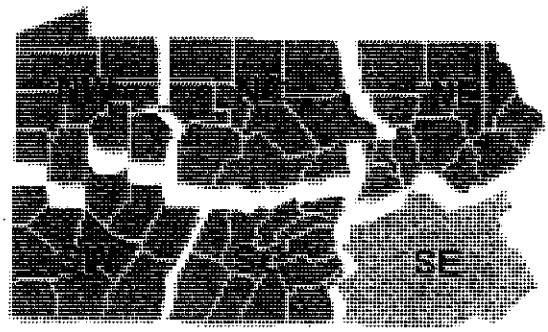
Serious Threats

The species below are the most serious threats or worst offenders to our native ecosystems. Many have been designed as "Noxious Weeds" by the Pennsylvania Department of Agriculture and are also a major concern to our agricultural community.



Pennsylvania Regions

Six Pennsylvania Regions were used to show state distribution:
SE = Southeast **SC** = Southcentral **SW** = Southwest
NE = Northeast **NC** = Northcentral **NW** = Northwest
Freq. = Frequent Occ. = Occasional Rare

Scientific Name	Common Name	Plant Form	Pennsylvania Distribution
Alliaria petiolata	Garlic mustard	Flower	Freq: SE, SC, SW, NW; Occ: NE
Notes: Invasive in many states; spreading aggressively in woodlands by seed			
Carduus nutans	Musk thistle	Flower	Freq: SE, SC, SW, NE, NC, NW
Notes: PA noxious Weed			
Cirsium arvense	Canada thistle	Flower	Freq: SE, SC, SW, NE, NC, NW
Notes: PA noxious Weed			
Cirsium vulgare	Bull thistle	Flower	Freq: SE, SC, SW, NE, NC, NW
Notes: PA noxious Weed			
Datura stramonium	Jimsonweed	Flower	Freq: SE, SC, SW; Occ: NE
Notes: Sometimes cultivated; spreads by seed, PA Noxious Weed			
Galega officinalis	Goatsrue	Flower	Rare: SE
Notes: PA and Federal Noxious Weed, on location in SE PA			
Heracleum mantegazzianum	Giant hogweed	Flower	Rare: NW
Notes: PA and Federal Noxious Weed, sap can cause burning blisters			
Lythrum salicaria, L. virgatum	Purple loosestife	Flower	Freq: SE; Occ: SC, SW, NE, NC, NW
Notes: Garden escape which has become invasive in many states; PA noxious Weed			
Microstegium vimineum	Japanese stilt grass	Grass	Freq: SE; Occ: SC
Notes: Annual grass; invasive in many states; spreading through woodlands by seed			
Phragmites australis	Common reed	Grass	Freq: SE; Occ: SC, SW, NE, NW
Notes: Native and introduced strains; wetland grass which can form huge colonies			
Polygonum (Falopia) cuspidatum	Japanese knotweed	Flower	Freq: SE; Occ: SC, SW, NE, NW; Rare: NC
Notes: Invasive in many states; difficult to control; spreads by roots and seeds			
Sorghum bicolor ssp. drummondii	Shattercane	Grass	Freq: SE; Occ: SC, NC
Notes: Grass; PA noxious Weed			
Sorghum halepense	Johnson grass	Grass	Freq: SE; Occ: SC, SW, NE, NW
Notes: Grass; PA noxious Weed; spreads by roots and seeds			
Elaeagnus umbellata	Autumn olive	Shrub	Freq: SE, SC; Occ: SW; Rare: NE, NW
Notes: Escaped from plantings and invasive in many states; rapidly spread by birds			

Lonicera maackii	Amur honeysuckle	Shrub	Occ: SE, SC, NW
Notes: Escaped from plantings; seeds spread by birds			
Lonicera morrowii	Morrow's honeysuckle	Shrub	Freq: SE, SC, SW; Occ: NE, NC, NW
Notes: Escaped from plantings and invasive in many states; seeds spread by birds			
Lonicera standishii	Standish honeysuckle	Shrub	Occ: SE
Notes: Escaped from plantings; seeds spread by birds			
Lonicera tartarica	Tartarian honeysuckle	Shrub	Freq: SE, SC, SW; Occ: NE, NW
Notes: Escaped from plantings; seeds spread by birds			
Rosa multiflora	Multiflora rose	Shrub	Freq: SE, SC, SW; Occ: NE, NC, NW
Notes: Invasive in many states; seeds spread by birds; PA noxious Weed			
Acer platanoides	Norway maple	Tree	Freq: SE; Occ: SE, SW
Notes: Commonly planted and escaped; invasive in many states; wind spreads prolific seeds			
Ailanthus altissima	Tree-of-heaven	Tree	Freq: SE, SC; Occ: SW
Notes: Invasive in many states; wind spreads prolific seeds			
Celastrus orbiculatus	Oriental bittersweet	Vine	Freq: SE, SC, SW; Rare: NE, NW
Notes: Escaped from cultivation and invasive in many states; spreading rapidly (by birds)			
Lonicera japonica	Japanese honeysuckle	Vine	Freq: SE, SC; Occ: SW, NE
Notes: Invasive in many states			
Polygonum perfoliatum	Mile-a-minute vine	Vine	Freq: SE; Rare: SW
Notes: Range expanding; PA Noxious Weed			
Pueraria lobata	Kudzu	Vine	Freq: SE; Rare: SW
Notes: Invasive in many states; PA Noxious Weed			

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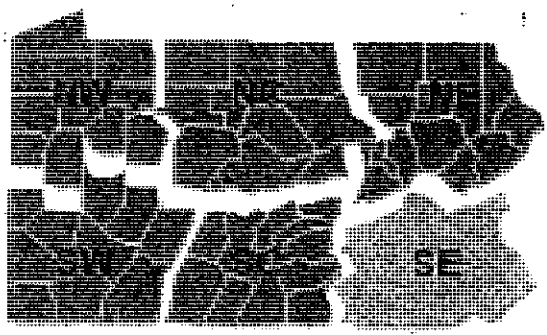
Moderate Threats

The following species are invasive plants that are known to invade our native plant communities and are deserving of our vigilance.



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Scientific Name	Common Name	Plant Form	Pennsylvania Distribution
Aegopodium podagraria	Goutweed	Flower	Freq: SE; Occ: SC, SW, NE, NC, NW
Notes: Commonly planted in the past and escaped; spreads aggressively by roots			
Bromus tectorum	Cheatgrass	Grass	Freq: SE, SC; Occ: SW, NE, NW; Rare: NC
Notes: Annual grass; very invasive throughout the west; spreads by seed			
Hesperis matronalis	Dame's rocket	Flower	Freq: SE, SC, SW, NE; Occ: NC, NW
Notes: Planted in gardens; escaped and naturalized along roads; spreads by seed			
Myriophyllum spicatum	Eurasian water-milfoil	Flower	Freq: SE, NW; Occ: NE; Rare: SC, SW
Notes: Invasive in many states; aquatic			
Ornithogallum nutans, umbellatum	Star-of-Bethlehem	Flower	Freq: SE, SC, SW
Notes: Common garden plant which has widely escaped			
Pastinaca sativa	Wild parsnip	Flower	Freq: SE, SC, SW; Occ: NE, NC, NW
Notes: Found commonly along roadsides; widespread and abundant; spread by seed			
Perilla frutescens	Beefsteak plant	Flower	Freq: SE, SC
Notes: Garden escape; widespread mostly along roadsides; spread by seed			
Phalaris arundinacea	Reed canary grass	Grass	Freq: SE, SC, SW; Occ: NE, NC, NW
Notes: Aggressive wetland grass; native and introduced strains; widespread and abundant			
Ranunculus ficaria	Lesser celandine	Flower	Freq: SE; Rare: SC, SW
Notes: Spreads by roots and shoots; can be very aggressive in wetlands			
Berberis thunbergii	Japanese barberry	Shrub	Freq: SE, SC, NE; Occ: SW, NC, NW
Notes: Escaped from cultivation and invasive in many states; spread by birds			
Berberis vulgaris	European barberry	Shrub	Freq: SE; Occ: SC, SW, NE, NC, NW
Notes: Escaped from cultivation; spread by birds			
Elaegnus angustifolia	Russian olive	Shrub	Occ: SE, SC, SW
Notes: Escaped from plantings and invasive in many states; spread by birds			
Ligustrum obtusifolium	Border privet	Shrub	Freq: SE, SC; Occ: SW, NE, NW; Rare: NC
Notes: Escaped from cultivation; seeds spread by birds			
Ligustrum vulgare	Common privet	Shrub	Freq: SE, SC; Occ: SW, NE
Notes: Planted very commonly in the past and escaped; invasive in many states			
Lonicera morrowii x tatarica	Bell's honeysuckle	Shrub	Occ: SE, SC, NW

Notes: Escaped from cultivation			
Rhamnus catharticus	Common buckthorn	Shrub	Freq: SE, SC; Occ: SW
Notes: Becoming a problem in PA			
Rhamnus frangula	Glossy buckthorn	Shrub	Occ: SE, SC, SW, NE, NC, NW
Notes: Becoming a problem in PA			
Rubus phoenicolasius	Wineberry	Shrub	Freq: SE, SC; Occ: SW
Notes: Common bramble; not cultivated; spread by seed			
Ulmus pumila	Siberian elm	Tree	Occ: SE, SC; Rare: SW
Notes: Escaped from cultivation			
Akebia quinata	Fiveleaf akebia	Vine	Occ: SE; Rare: SC
Notes: Escaped from cultivation			
Ampelopsis brevipedunculata	Porcelain-berry	Vine	Occ: SE, SW
Notes: Escaped from cultivation			

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NON-NATIVE INVASIVE SPECIES

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-Insect Manifestation
-Non-Native Invasive Species
-Housing & Development

PAPowerPort

Non-native invasive species are fast becoming one of the largest threats to wildlife habitat in Pennsylvania. An estimated 4,000 exotic plants and 2,300 exotic animal species are documented across the United States (www.natureserve.org). Invasives are one of the leading threats to native species (Ludsin and Wolfe 2001). Nation-wide 42% of all endangered and threatened species are impacted by non-native species with exotics the major cause of listing for 18% of listed species (www.natureserve.org). Economic damages, including the control of invasives, are estimated at $137 billion annually (Ludsin and Wolfe 2001). Invasive species are found throughout Pennsylvania's native habitats with 111 species documented by Morris Arboretum as non-native invasives that threaten native communities (see Appendices). Many of the state's plants are non-native (Table 1). The severity of non-native invasive species was recognized

Not all non-native species are harmful to other species or to wildlife, however some species may have severe impacts. Some herbaceous layer species are inhibiting regeneration in areas disturbed by deer natural water erosion or human activities. Asian stiltgrass (*microstegium vimineum*) and garlic mustard (*Allaria petiolata*) are two exotic plants spreading rapidly through our forests. New research suggests stiltgrass inhibits herbaceous re-growth and may have detrimental impacts on wildlife such as salamanders. Research being conducted in Pennsylvania and New York suggests that non-native soil invertebrates may enhance the spread of stiltgrass and other non-native invasive plants by altering the soil chemistry and structure. Non-native earth worms may be an important factor reducing the leaf litter layer and soil quality, which in turn inhibits regrowth of native tree seedlings and herbaceous plants, and enhances conditions for non-native plant invasions (J. Maerz, Cornell Univ., pers. Comm.). The non-native plant and invertebrate communities invading the forest floor in many areas is enhanced through runoff and disturbance of the soil. Birds and mammals that feed on forest floor invertebrates, beetles, etc. may be adversely affected by the shift in species communities and the depletion of the soil quality. Deer and other herbivores do not feed on stiltgrass and garlic mustard in areas where they invade. These species out-compete

Site Map
Text Version

native blueberry and other herbaceous plants, reducing forage for species such as grouse and turkey. As invasions increase in forests, the full extent of this new threat will become better understood. Research on the impacts of non-native invasive species in Pennsylvania's forests is only just beginning. However, the potential for negative effects is high.

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Introduced, invasive species threaten 19% of all endangered and rare species worldwide (Reid and Miller 1989). New diseases and alien pests and other threats loom on the horizon. For waterways, the full impacts of some alien invasive species such as the rusty crayfish are not yet known, but the zebra mussel and others have shown their wide-ranging impact on native habitats and species.

Oak decline disease now found in western United States could have sweeping consequences reminiscent of the chestnut blight on today's oak dominant forests, if it takes hold in the eastern United States. Amphibian populations have been threatened with new diseases, perhaps facilitated by pollutants or atmospheric changes. Conservation of Pennsylvania wildlife may require greater attention to activities beyond the state's borders in the future.

The hemlock wooly adelgid may reduce one of our most important conifer species drastically within the next decade. Terrestrial invertebrates and native salamanders may be affected by the widespread invasion herbaceous species such as garlic mustard and stiltgrass into the forest herbaceous layer. New understanding is needed to unravel the success non-native species are finding in native habitats. Some researchers suggest non-native earth worms are facilitating the spread of plants and depleting the viability of the leaf litter for native plants and organisms. In some regions, invasive species are just gaining momentum (e.g., in Berks and Schuylkill counties, invasive plants have only been appreciably invading the forest floor during the last 10-15 years, pers. Obs.). The full impact of non-native invasive species on native habitats and wildlife are just beginning to be understood, and should be a top priority for research and management focus.

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