LAUREL RUN Watershed

Coldwater Conservation Plan

COLDWATER HERITAGE PARTNERSHIP

Western Pennsylvania Conservancy

water, land, life.

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Prepared by

Western Pennsylvania Conservancy

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water, land, life.

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COLDWATER HERITAGE PARTNERSHIP

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Executive Summary

In February 2006, Western Pennsylvania Conservancy (WPC) was awarded funding from the Coldwater Heritage Partnership to complete a Coldwater Conservation Plan for the Laurel Run watershed, a Class A Wild Trout Stream and Exceptional Value (EV) watershed in Somerset County, Pennsylvania. The objectives of this project were to provide current data about the ecological health of the stream, identify unique features of the watershed, and to increase public awareness and support for the long-term stewardship of the Laurel Run watershed. This Coldwater Conservation Plan explains the methods employed in WPC's field investigations, data analyses, and public outreach. It also provides the results of these investigations, from which conclusions are made regarding the ecological health of Laurel Run. Recommendations for the protection and long-term conservation of the Laurel Run watershed are also outlined.

Headwater pond covered with ice.

WPC investigated the health of the Laurel Run watershed through visual assessment, fish surveys, macroinvertebrate sampling, water quality testing, and public involvement. The visual assessment rated all of the mainstem stream segments of Laurel Run as either "excellent" or "good," with only minor notable impairments, such as two horse pasture areas and erosion. The electrofishing survey found a diverse assemblage of fish species, including a number of native brook trout. One possible shortcoming of Laurel Run's fish community was found to be a lack of abundant populations of large, older-age-class brook trout, which could be partially a result of overfishing, as well as other natural stream habitat factors and fish community dynamics. Populations of small, young-of-year brook trout, however, were abundant, indicating that the brook trout are successfully reproducing. Laurel Run's macroinvertebrate samples revealed diverse communities with high percentages of pollution-sensitive taxa and biological integrity scores indicative of good water quality, with the two uppermost headwater samples being minor exceptions to this conclusion. Overall, the macroinvertebrate communities support Laurel Run's standing as a stream of high biological quality. Water quality testing also revealed general excellent water quality, with almost all parameters being within recommended ranges. The protection of water quality and stream habitat for benthic macroinvertebrates is vital to sustaining the native brook trout and other fish populations in Laurel Run, and the long-term stewardship of the watershed.

The results of WPC's investigations indicated that Laurel Run is indeed a stream of excellent biological, recreational, and aesthetic value. As a watershed with many outstanding features and few notable water quality problems, the overriding recommendation for Laurel Run should focus on protection, stemming from an active, conservation-minded community that is willing to take personal responsibility for maintaining and improving the physical and biological merits of the watershed. This Coldwater Conservation Plan comes at an ideal time to increase awareness of the few potential problems in the Laurel Run watershed and prevent them from worsening and posing future water quality threats.

WPC hopes that this Coldwater Conservation Plan, and the substantial local interest it has generated, will aid other organizations, such as the Somerset Conservation District (SCD), in the future development of larger, comprehensive conservation plans and projects for the Laurel Run and Wills Creek watersheds.

Introduction

Conservation Plan Objectives

The coldwater conservation plan for Laurel Run consists of an analysis of stream health based upon water quality data and biological resource surveys, and recommendations for its future protection based upon these data and community input. The goals were to provide current data about the ecological health of the stream, to identify unique features of the watershed, and to increase public awareness and support for the long-term stewardship of this valuable aquatic resource. WPC has partnered with the Coldwater Heritage Partnership (CHP), SCD, the Pennsylvania Department of Conservation and Natural Resources (DCNR), the Pennsylvania Fish and Boat Commission (PFBC), the Western Pennsylvania Watershed Program, and Pennsylvania Trout in the completion of this project.

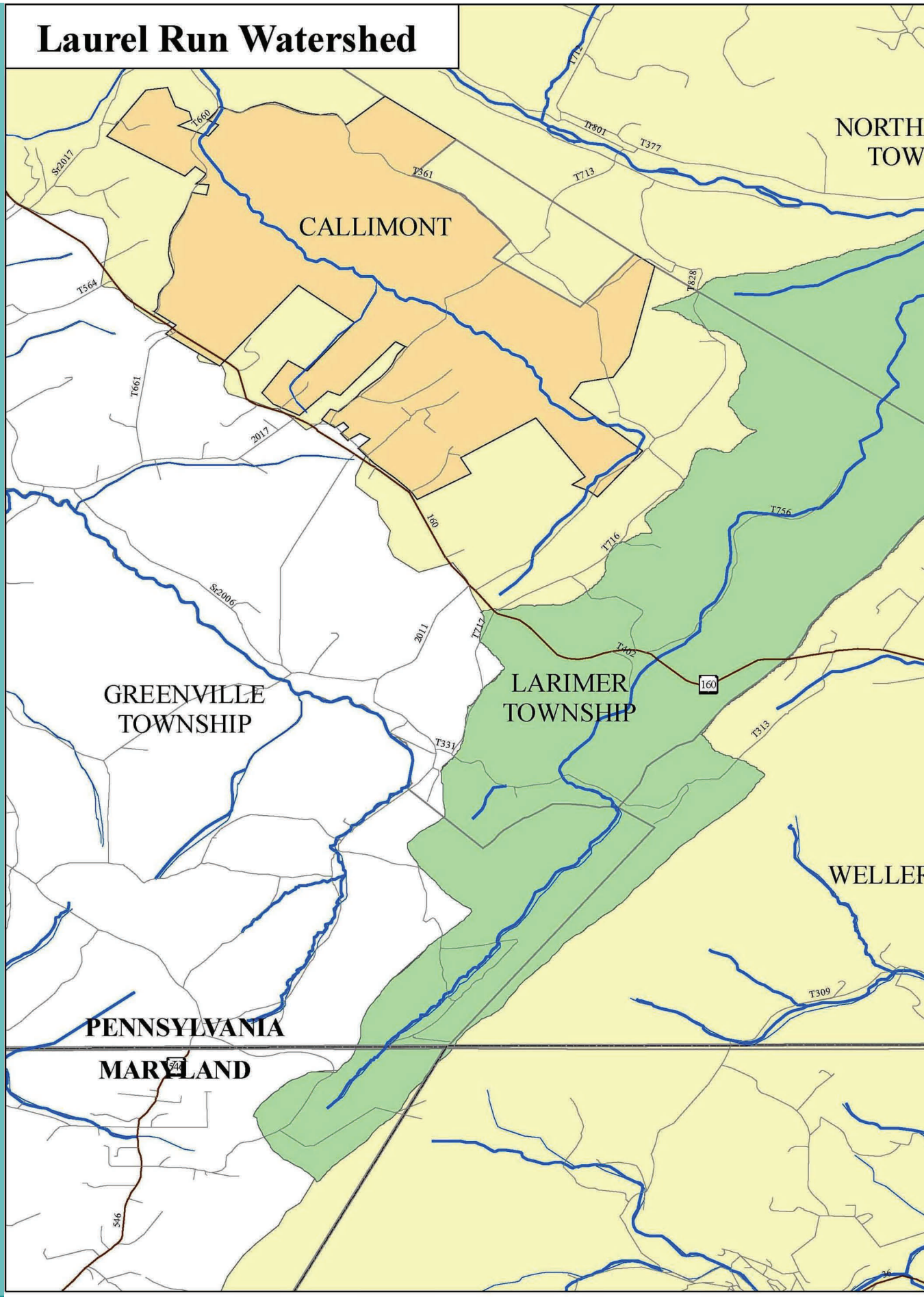
Background

The Laurel Run watershed is an 8.97-square-mile drainage within the Wills Creek watershed, a tributary of the North Branch of the Potomac River. The headwaters of Laurel Run begin just south of the Pennsylvania state line in Garrett County, Maryland. Laurel Run then flows northeast through Somerset County, Pennsylvania, passing through Larimer and Northampton townships and flowing under Township Route 331 (TR-331) and State Route 160 (SR-160). The stream flows through State Game Lands (SGL) 82 before it empties into Wills Creek in Northampton Township (Figure 1).

The majority of the Laurel Run watershed is comprised of forested land (86% deciduous, 3% evergreen, 1% mixed), with some pastureland (7%), small amounts of cultivated crops (0.6%), and a small area of barren land near the stream's headwaters (Figure 2). With the exception of a few hunting cabins and houses, there are almost no residential areas, and roads make up only two percent of the land use in the watershed. Laurel Run therefore incurs very few water quality impacts, which helps it to sustain a naturally reproducing native brook trout population.

Laurel Run is a distinctive watershed both state-wide and locally. According to CHP, only 25 percent of Pennsylvania's stream miles are designated as High Quality Cold Water Fisheries (HQ-CWF) by the Pennsylvania Department of Environmental Protection (PADEP). Of these, only two percent are designated as highly productive waters containing naturally producing wild trout. Laurel Run falls into this distinguished category. Laurel Run is also one of only six Class A Wild Trout streams containing native brook trout within Somerset County, and the only subwatershed that meets these criteria in the Wills Creek drainage. In addition, Laurel Run is the only stream within the Wills Creek watershed with an EV designation, the highest PADEP stream quality classification. As of the year 2000, only about two percent of Pennsylvania's stream miles were designated as EV. See Appendix D for more information about HQ and EV designations.

In 1973, Laurel Run and other Wills Creek tributaries were included as "Conservation Areas" in PADEP's water quality standards report, a title which was later replaced with the water-use designations of "High Quality" and "Exceptional Value." The upper one-third of Laurel Run (2.86 miles), from the Pennsylvania-Maryland state line down to the TR-331 bridge (Shirley Hollow Road), was officially made EV in PADEP's final rulemaking on September 8, 1979 (PA Bulletin 1979). This section qualified for EV status based on its designation by PFBC as a Wilderness Trout Stream (WTS), which applies to streams that provide a "wild trout fishing experience in a remote, natural and unspoiled environment where man's disruptive activities are minimized" (PFBC 2007). Conservation Area streams lacking WTS status, including the remaining two-thirds of Laurel Run (5.61 miles), were given the next highest stream quality designation of HQ-CWF. Laurel Run's designation as a Class A Wild Trout Stream also qualifies it for HQ-CWF status.


Laurel Run Watershed
CALLIMONT
GREENVILLE
TOWNSHIP
LARIMER
TOWNSHIP
NORTH
TOW
WELLER
PENNSYLVANIA
MARYLAND
T660
S2017
T361
T564
T661
2017
160
S2006
2011
T712
T716
T756
T828
T801
T377
T713
T402
T331
T313
T309
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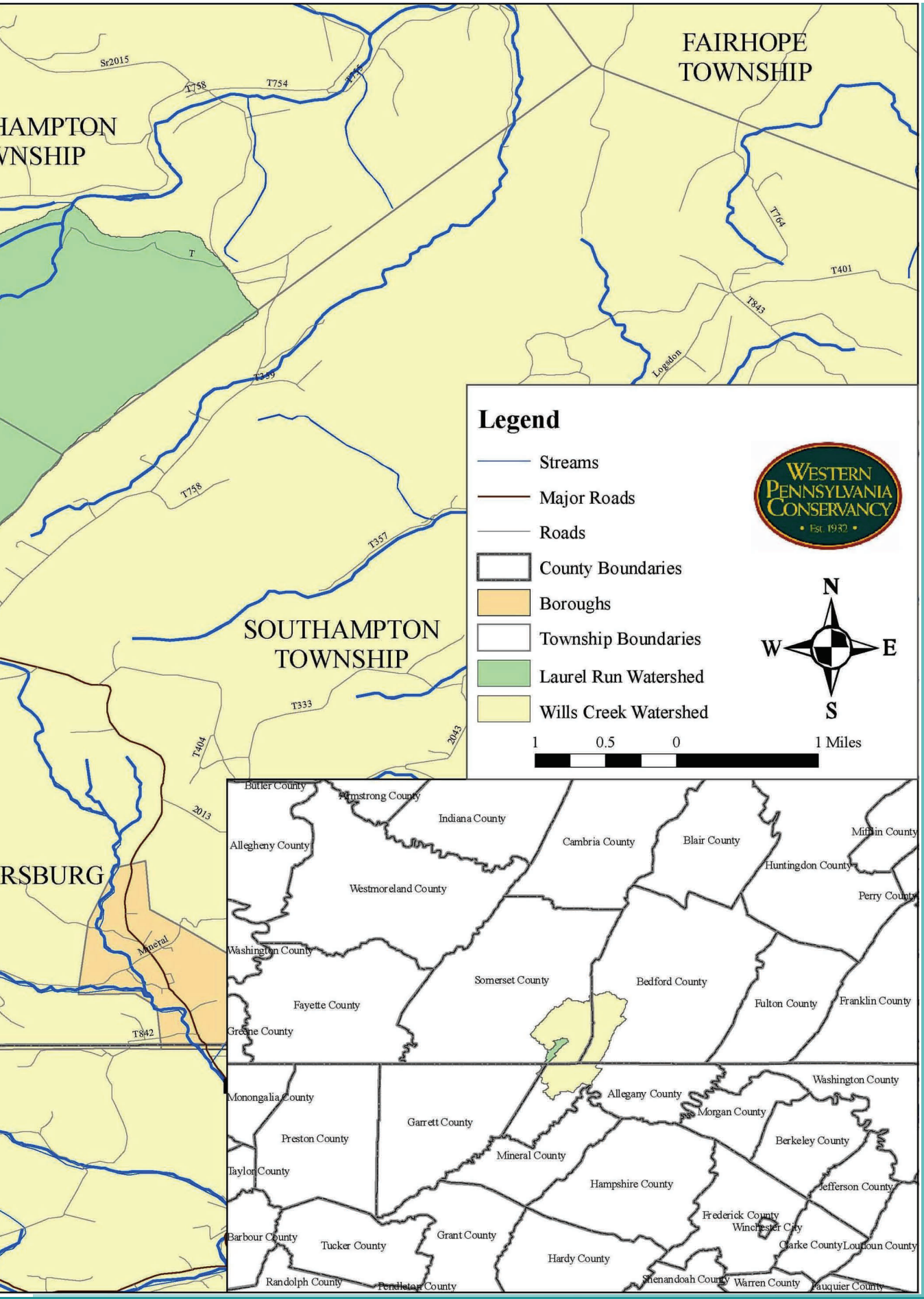


Figure 1.
Map of the Laurel Run watershed and surrounding area, including roads and nearby municipalities.

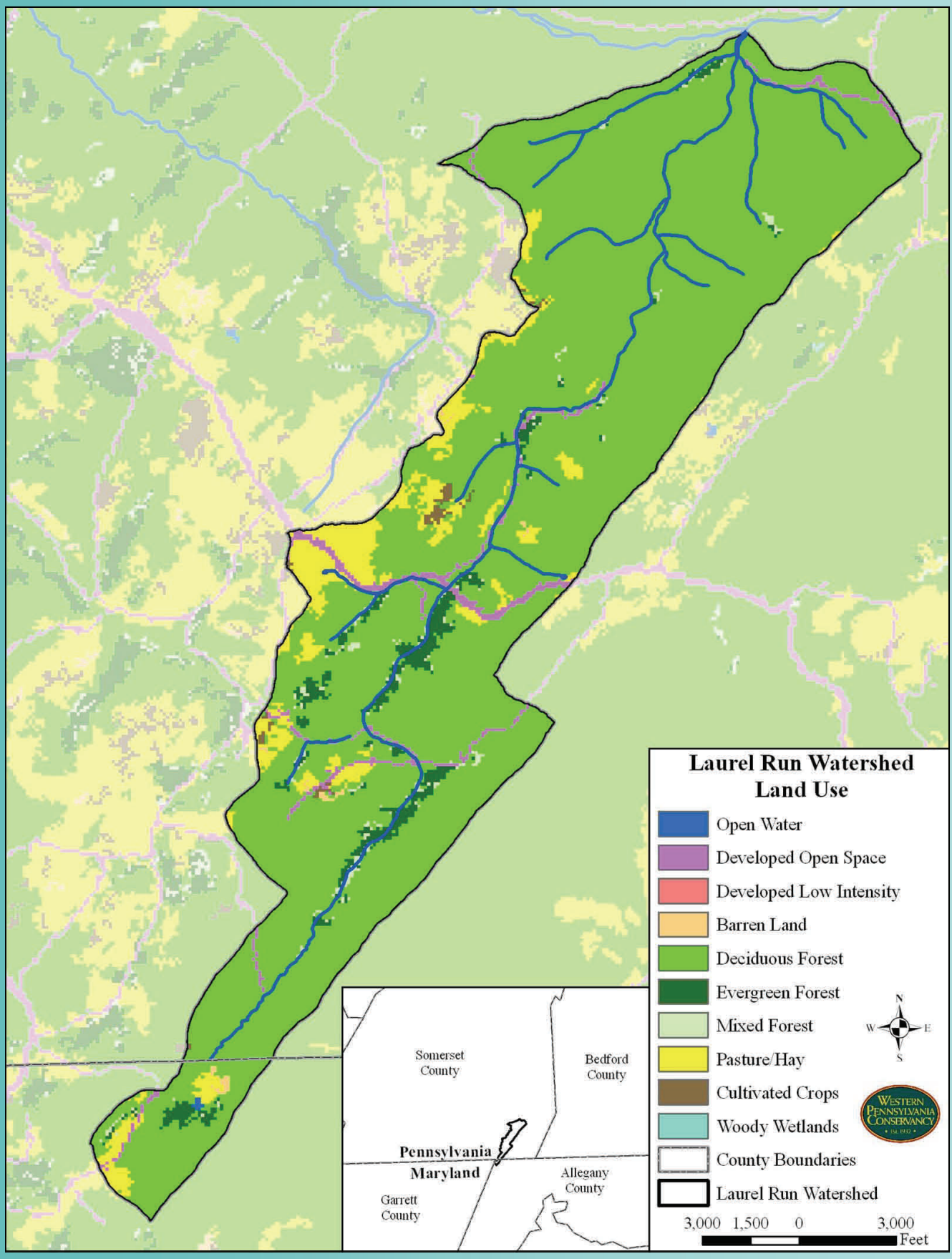


Figure 2.
Land-use map of the Laurel Run watershed. The watershed is dominated by deciduous forest, with small amounts of evergreen forest and pasture/hay fields.

Geology and Topography

The Laurel Run watershed is contained within the Allegheny Front Section of the Appalachian Plateaus physiographic province (Landforms 2000). The topography of the Allegheny Front Section is characterized by rounded to linear hills to the east, which are cut by narrow valleys and rise in a stepwise fashion to a steep ridge, with undulating hills sloping away to the west of this ridge. The underlying rock types are sandstone, siltstone, and shale. The relief pattern of this section is moderate to high, with elevations ranging from 540 feet to 2,980 feet (Figure 3).

Laurel Run is a high-gradient stream, ranging in elevation from approximately 3,000 feet in the headwaters to 1,700 feet at the mouth. The most prevalent underlying geological formation directly adjacent to the stream is the Catskill Formation, which is characterized by grayish-red sandstone, siltstone, shale, and mudstone, and is locally **conglomeratic**. Also within the watershed are the Foreknobs, Mauch Chunk, Pocono, Pottsville, and Rockwell formations (Figure 4).

Wills Creek, to which Laurel Run is a tributary, is deeply incised into the terrain and cuts transversely across the Wellersburg **syncline nose**, so that the Pottsville outcrop belts of both flanks converge from the northeast and southwest and merge at Wills Creek valley. There is a direct relationship between drainage, structure, and **stratigraphy** in the area of the Wills Creek watershed. Two resistant conglomeratic zones in the Jennings Formation form arc-shaped ridges, whose associated valleys are developed in less-resistant shales, siltstones, and minor sandstones. Other stream valleys in the Wills Creek watershed, such as that of Little Wills Creek, show a similar but less marked relation.

The Jennings Formation, which is made up of interbedded red and green shales and siltstones, has rather poor permeability, making it a poor water bearer. Groundwater is therefore limited in the area and adds only limited base flow to the streams of the surrounding area, including Laurel Run. Most of the area is made up of the moderately deep and well-drained Berks-Weikert soil type. The soils on steep areas are wooded and some areas are in pasture, with a few areas being used for residential sites and recreation. Cultivation of this soil type is limited due to the slope and the shallow, moderated depth to bedrock (Flint 1965).

Upstream view of Laurel Run, downstream of Shirley Hollow Road bridge, where an unnamed tributary enters the stream on the right.

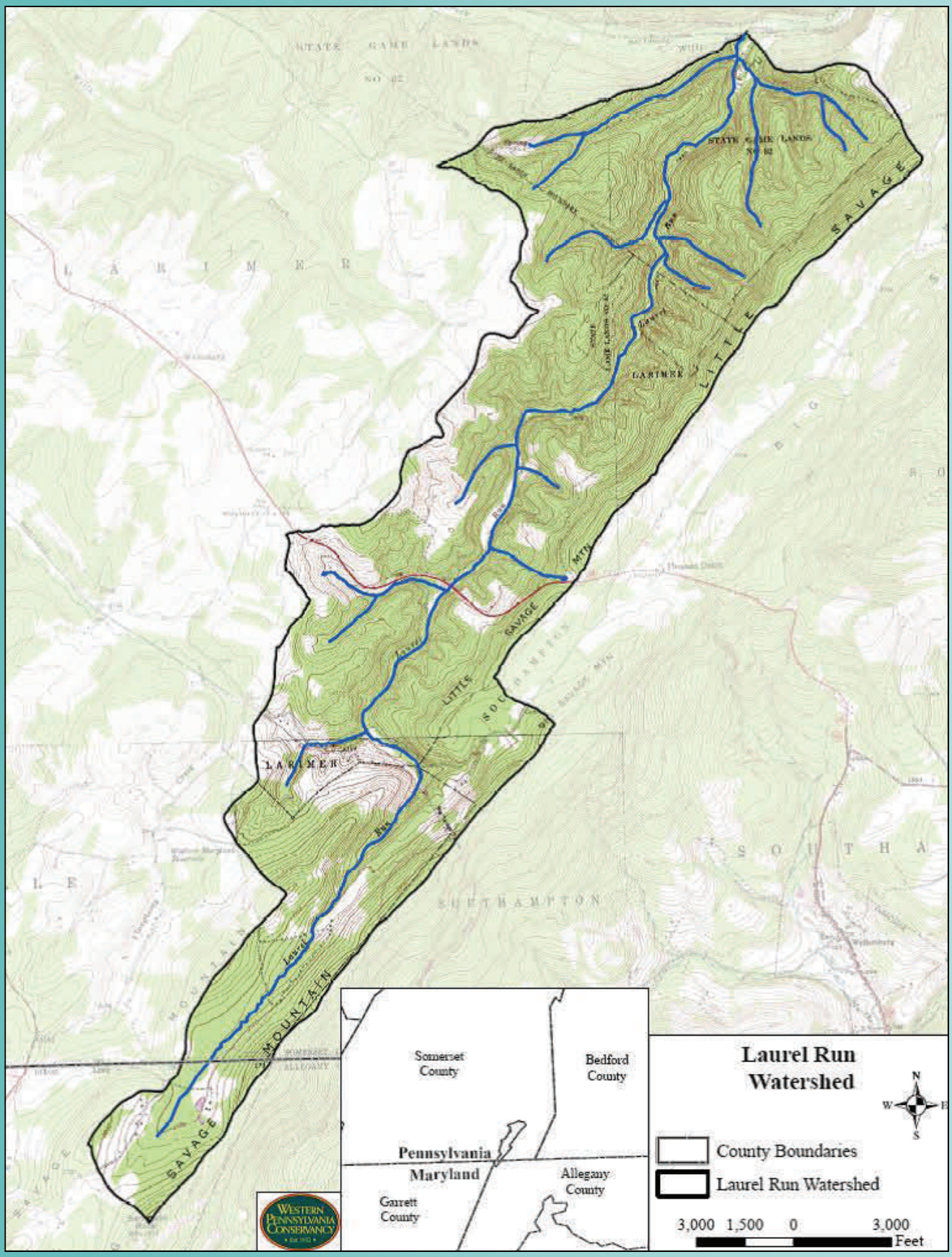


Figure 3.
Topographic map of the Laurel Run watershed.

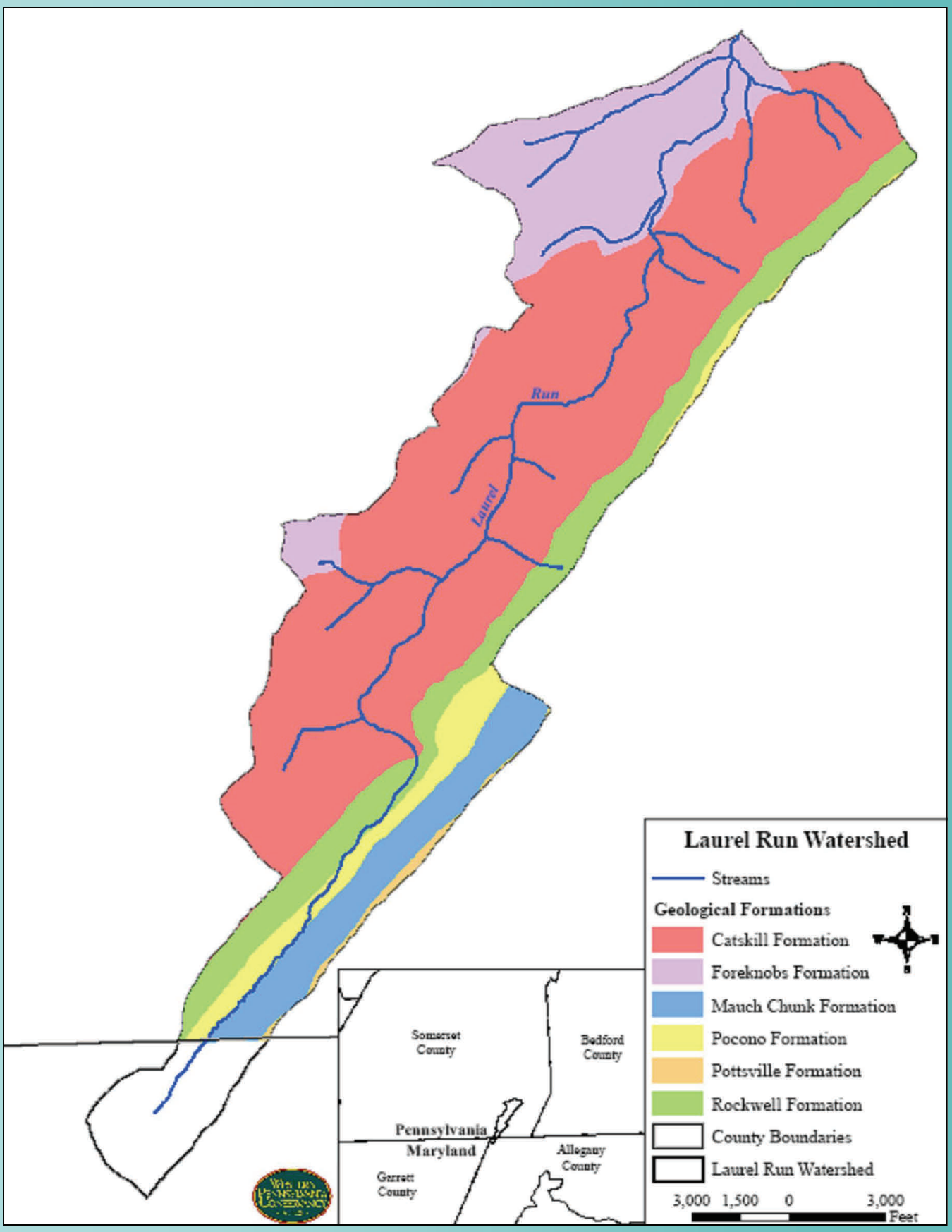


Figure 4.
Map of underlying geological formations in the Laurel Run watershed. Geological information was not available for the headwater portion in Maryland.

Methods

Visual Assessment

WPC staff performed a visual assessment of the Laurel Run watershed on four separate dates: October 13, 2006, November 21, 2006, December 20, 2006, and April 19, 2007. The assessment method was based on the United States Department of Agriculture's (USDA) Visual Assessment Protocol, which entails walking the length of the stream and major tributaries and rating ten physical factors of stream quality: channel condition, riparian zone, bank stability, water appearance, nutrient enrichment, fish barriers, instream fish cover, riffle embeddedness, invertebrate habitat, and canopy cover. The ratings from each of these categories are averaged to give an overall score between one and ten for that stream reach, which correspond with a rating of poor, fair, good, or excellent. The visual assessment for the Laurel Run mainstem was conducted in an upstream direction, beginning at the mouth of the stream off of McKenzie Road. The four tributaries that were included in the visual assessment were also assessed by walking upstream.

In addition to developing a qualitative understanding of the physical condition of the watershed, the visual assessment was also used to help establish areas for fish, macroinvertebrate, and water chemistry sampling.

Electrofishing

Fish sampling was conducted by PFBC-certified WPC staff, as well as local volunteers, on December 20, 2006, along four sample reaches (Figure 5), using an LR-24 backpack electrofishing unit from Smith-Root, Inc. Sampling reaches were named EF-1 through EF-4. Site EF-1 began at the mouth of Laurel Run and extended upstream 160 meters to a footbridge crossing the stream. Site EF-2 is located off of Paso Fino Road (formerly called Gomer Hollow Road) and is about 80 meters in length. Site EF-3 was directly downstream of the bridge crossing Shirley Hollow Road and was about 75 meters in length. Site EF-4 was near the source of Laurel Run, south of the Pennsylvania border in Garrett County, Maryland, downstream of a driveway off of Sampson Rock Road.

A single-pass electrofishing survey was performed along the length of each sample site. This method consisted of walking in an upstream direction and shocking beneath the water surface in as much of the stream area as possible, paying extra attention to areas that fish are likely to inhabit, such as large boulders, deep pools, and undercut banks. As they were spotted, the immobilized fish were scooped up in nets and stored in buckets of water, where they were then counted and identified to species level before being released back into the stream. The length of each brook trout (*Salvelinus fontinalis)* was measured before release.

To calculate the **biomass** of brook trout collected in each sample reach, the length of each fish was first converted to an estimated weight using length-weight regression coefficients for stream brook trout (Schneider et al. 2006). The cumulative weight of brook trout for each sample reach was then divided by the area for that reach, to give a biomass in pounds per acre. Because single-pass surveys were conducted instead of the triple-pass depletions typically used for quantitative biological surveys, these calculated biomass values could be used only for qualitative presence/absence analyses of the brook trout populations. The biomass values almost certainly would have been higher at each sample site had triple-pass depletions been used.

Electrofishing site EF-1, above the confluence of Laurel Run with Wills Creek.

In order to analyze the overall health of the fish community in Laurel Run, an **Index of Biotic Integrity (IBI)** was calculated for each of the three sample sites where fish were found. The original concept for the IBI was developed by James Karr (1981), and various fish IBIs are now available, which vary based on the metrics used and the geographic regions and stream types to which they apply. Two different IBIs were used for the analysis of the Laurel Run fish data, which will be referred to as IBI#1 and IBI#2.

Index of Biotic Integrity (IBI) - Fish

IBI#1: The first IBI used in the analysis comes from the New Jersey Department of Environmental Protection (2006). This IBI measures the health of a stream based on multiple zoogeographic, ecosystem, community, and population characteristics of the fish assemblage, and each site is scored based on how much it deviates from the reference conditions that would be found in an un-impacted stream. This IBI incorporates ten different biometrics (listed below); the scoring criteria for the first four vary based on the size of the watershed. The sample site is given a score of one, three, or five for each metric, which are added together to give a score ranging from ten to fifty. These scores translate into a classification of "poor," "fair," "good," or "excellent."

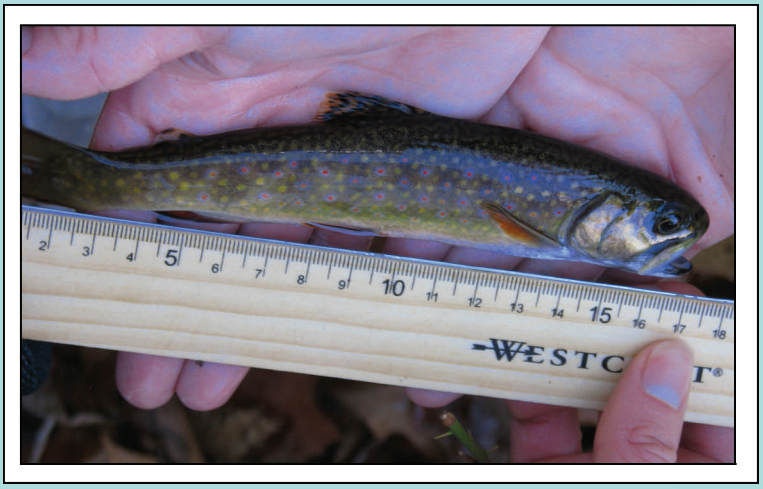
Species Richness and Composition:
1. Total number of fish species.
2. Number of benthic insectivorous species.
3. Number of trout and sunfish species.
4. Number of intolerant species.
5. Proportions of individuals as white suckers.

Trophic Composition:
6. Proportion of individuals as generalists (carp, creek chub, goldfish, fathead minnow, green sunfish, and banded killifish).
7. Proportion of individuals as insectivorous cyprinids.

Electrofishing at site EF-1.

8. Proportion of individuals as trout or proportion of individuals as piscivores (top carnivores) – excluding American eel (whichever gives higher score).

Fish Abundance and Condition:
9. Number of individuals in sample.
10. Proportion of individuals with disease or anomalies (excluding blackspot disease).



Measuring the length of a brook trout collected during the electrofishing survey.

IBI#2: The second IBI used in the analysis comes from the Maryland Biological Stream Survey (MBSS), developed for the Maryland Department of Natural Resources (Sutherland 2005). This IBI uses different metrics based on the ecological region and stream type stratum. The sample site is given a score of one, three, or five for each metric, and the mean of these scores gives an IBI score between one and five for that site. Laurel Run falls into the category of a Coldwater Highlands stream, which uses the following four metrics for the fish IBI:

1. Abundance per square meter.
2. Percent tolerant species.
3. Percent brook trout.
4. Percent sculpins.

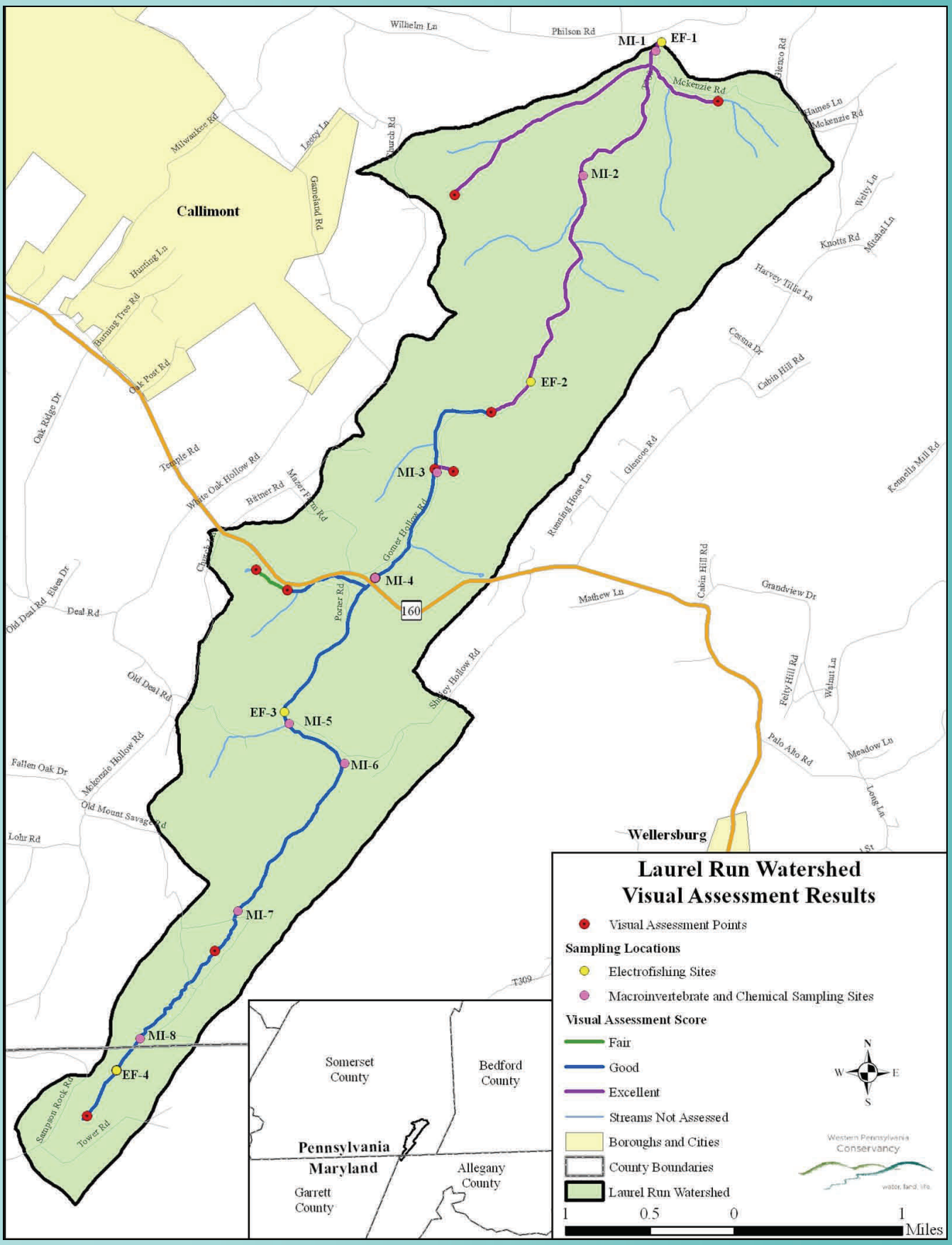


Figure 5.
Stream quality designation results from the visual assessment of Laurel Run. Electrofishing and

Macroinvertebrates

WPC and SCD staff, and one local volunteer, conducted macroinvertebrate sampling on April 19, 2007 at eight sites along the length of Laurel Run (Figure 5). A quantitative method was employed at each site, in which a **Surber sampler** was used to sample three riffle areas, each with a fixed area of 0.25 square meters. Sampling focused on riffle areas because this stream habitat type is typically most conducive to macroinvertebrates. The macroinvertebrate samples were stored in ethyl alcohol and taken to the WPC Freshwater Conservation Program laboratory, where they were then counted and identified to the family level, up to an approximate maximum of 300 organisms for each sample. Several metrics were then calculated to facilitate analysis of the macroinvertebrate data from each site, including a Pollution Tolerance Index (PTI), the percentage of **EPT taxa,** and an **Index of Biotic Integrity** (IBI) (Appendix A).

Sampling benthic macroinvertebrates at site MI-6.

The PTI is used to evaluate water quality based on the pollution sensitivity of organisms found in benthic stream samples. Macroinvertebrate **taxa** are divided into four groups based on their varying tolerance levels to pollution: Group 4 taxa are very tolerant, Group 3 taxa are moderately tolerant, Group 2 taxa can exist in a wide range of conditions, and Group 1 taxa are the most pollution-sensitive. A dominance of Group 3 and 4 taxa is normally a sign of poor water quality, while a stream dominated by Group 1 taxa, resulting in a PTI rating of greater than 23, normally has excellent water quality.

The EPT taxa refers to macroinvertebrates in the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). A high percentage of EPT taxa in benthic stream samples typically indicates good water quality, as these macroinvertebrates are generally sensitive to pollution. For example, a stream macroinvertebrate sample containing 75 percent EPT taxa would indicate better water quality than a sample containing 25 percent EPT taxa.

The IBI calculated for the macroinvertebrate data from Laurel Run was obtained from a final draft version of a benthic IBI developed by PADEP for wadeable freestone streams in Pennsylvania (Chalfant 2007). This IBI is a multimetric index that integrates several attributes related to community structure and taxonomic composition into a single score for the overall biological condition of a macroinvertebrate community sample. The metrics included in the calculation of this IBI are a modified Beck's Index, EPT taxa richness, total taxa richness, the Shannon Diversity Index, the Hilsenhoff Biotic Index, and percent intolerant individuals. Scores for each of these individual metrics are standardized and then averaged to give an IBI score ranging from 0 to 100, with the highest scores indicating macroinvertebrate communities with the highest biotic integrity.

Water Chemistry

WPC staff measured several water quality parameters at each macroinvertebrate sampling site. A Hach DR/870 colorimeter was used to measure the **turbidity** and concentrations of **nitrates** and **phosphates**, and meters from Eutech Instruments/Oakton Instruments were used to measure **pH**, **total dissolved solids** (TDS), and **conductivity**. A YSI 550A meter was used to measure the **dissolved**

Testing dissolved oxygen and temperature at site MI-5.

oxygen (DO) concentration and temperature at each site.

The results of these water chemistry measurements were compared with standards set by the PADEP in Chapter 93 of the PA Code as well as other water quality benchmark criteria (Table 7). Each Chapter 93 water quality parameter has specific criteria associated with one or more critical uses such as Cold Water Fishery (CWF), HQ-CWF, and Potable Water Supply (PWS). The criteria listed in Table 7 are associated with the existing critical use that is most applicable to Laurel Run (i.e., nitrates and TDS do not have criteria associated with CWF or HQ-CWF, so the criteria for PWS are listed). Also, because there are no Chapter 93 criteria for phosphates, the listed benchmark comes from the U.S. Environmental Protection Agency's (USEPA) recommendation for the control of **eutrophication**.

Public Participation

An important component of any Coldwater Heritage project is public participation and input. In order to build community consensus for the conservation of Laurel Run, efforts were made to involve watershed landowners and other stakeholders in various stages of the development of the plan. Letters were sent to local residents in June 2006 to inform them of the project and encourage their involvement. On November 9, 2006, a public meeting was held for watershed residents to learn about the project and give their personal input. The meeting attendees completed written surveys in which they could demonstrate their knowledge of the watershed, convey their opinions and concerns for its protection, and express their interest in volunteering for the project. WPC gave a presentation explaining the components and objectives of the plan. Subsequently, SCD helped facilitate a discussion, which allowed meeting attendees the opportunity to ask questions about the project, express their concerns, and offer suggestions based on their local perspective of the watershed. Meeting attendees who expressed interest in volunteering were later invited to participate in the electrofishing survey on December 20, 2006, which also served as an informal setting for volunteers to discuss the project with WPC and SCD staff.

Public meeting on November 9, 2006.

Results

Visual Assessment

WPC's visual assessment assigned ratings of "excellent" or "good" for almost all of the assessed segments and major tributaries of Laurel Run (Figure 5). The only minor exception was the upper, unforested portion of a small tributary that enters Laurel Run just above Route 160 off of Porter Road, which received a "fair" rating. The land use along the majority of the stream was predominantly mixed deciduous forest with small coniferous stands. A few small stretches of the stream have other, non-forested land-use types. These include residential (a few hunting cabins and houses with mowed lawns), field (some of which was overgrown and brushy), and horse grazing pasture (one section next to Gomer Hollow Road and one section just above Route 160). Along the headwaters of Laurel Run is a combination of land-use types, including residential (hunting camp), mowed fields, a small patch of barren land, and forest with some recent logging.

The active channel width of Laurel Run ranged from approximately 25 feet (8.3 meters) near the mouth to 3 feet (1 meter) near the source of the stream. The stream substrate in the majority of Laurel Run is a mix of cobble, boulders, and gravel, with minimal silt. The substrate transitions to more silt with underlying clay as the stream approaches its source in Garrett County, Maryland. This clay surface geology, which facilitates surface flow by impeding the infiltration of water from rain events, is likely associated with the formation of the stream itself. The source of the largest branch of the headwaters was found to be a spring that emerges in an old wooden springhouse.

The visual assessment noted only minor water quality concerns, the most notable being the possibility of small amounts of nutrient contamination from horse manure in two small pastures. There is also light to moderate erosion in a few areas, such as along the streambanks by the horse pastures, near the mouth of Laurel Run where a lawn is mowed relatively close to the stream, and a few outside bends in the upper mile of the stream. Also, a pond in the headwaters overflows into the stream, which, due to summertime heating of the un-shaded, shallow, standing water, likely contributes water of a higher temperature than is ideal for native brook trout survival. However, because the pond contributes a comparatively small amount of water to Laurel Run when the entire length of the stream is considered, the effect of this heated water to the rest of the well-shaded, coldwater stream was found to be minimal.

Downstream view of Laurel Run below Gomer Hollow Road bridge on October 13, 2006, with horse pasture area in background.

In general, WPC found Laurel Run to be a healthy stream in a scenic, forested setting, with instream physical habitat characteristics ideal for fish and aquatic macroinvertebrate life. The combination of intact deciduous and coniferous forest, rugged landscape, and the picturesque

stream corridor of the Laurel Run watershed create an extraordinary natural setting that is pleasing to the eye.

Electrofishing Results

A total of ten species of fish were collected, including 29 native brook trout (*Salvelinus fontinalis*) ranging in size from 6 cm to 29 cm in length. The total weight of brook trout sampled in Laurel Run was 2.539 pounds. This tributary to Wills Creek appears to be in a healthy, productive state based on fish survey results and visual assessment scores. In addition to brook trout, several other fish species were found in notable quantities (Table 1). See Appendix A for a brief description of the life histories, habitat, and distributions of some of the more prevalent species found during electrofishing.

Table 1.

Fish species collected during electrofishing survey of Laurel Run on December 20, 2006. Site EF-4 is not included because no fish were found there.

Common Name	Scientific Name	EF-1	EF-2	EF-3
Central Stone Roller	*Campostoma anomalum*	1		
Mottled Sculpin	*Cottus bairdi*	7	16	7
Slimy Sculpin	*Cottus cognatus*	13	48	29
Black Redhorse Sucker	*Moxostoma duquesnei*		2	
Golden Redhorse Sucker	*Moxostoma erythrurum*	17		
Silver Shiner	*Notropis photogenis*	5		
Blacknose Dace	*Rhinichthys atratulus*	9	9	1
Longnose Dace	*Rhinichthys cataractae*	14	6	
Brook Trout	*Salvelinus fontinalis*	5	13	11
Creek Chub	*Semotilus atromaculatus*	8		
	Site totals	79	94	48

Site Results

EF-1

Description: Site EF-1 begins directly above the mouth of Laurel Run and extends upstream 160 meters to a footbridge crossing the stream. GPS coordinates are latitude 39.80908° and longitude -78.85935°. At this location the stream had an active channel width of eight meters. The substrate was dominated by boulder (40%) and cobble (45%) with a small amount of gravel (15%).

Fish Results: Sampling resulted in 79 individual fish, represented by nine species, from the 160-meter sampling reach. Of those collected, all were considered common to the drainage basin and should have been recovered in a survey such as this. The five brook trout collected from this site ranged in length from 11.0 cm (4.3 inches) to 29.0 cm (11.42 inches). Overall, the cumulative weights totaled 1.064 lbs, and the average weight per fish was 0.213 lbs, the highest average weight of the three sample sites (Figure 6). Extrapolation of trout weights into lbs/acre, a common value used in fisheries management,

showed that EF-1 had a production value of 3.36 lbs/acre, the overall lowest biomass density of the three sample sites (Table 2).

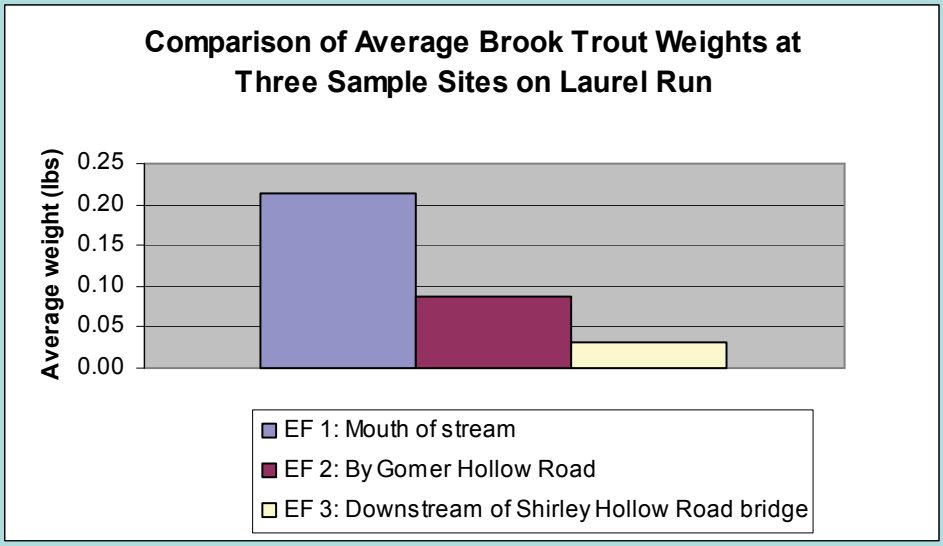


Figure 6.
Average weights of brook trout found at three electrofishing sites on Laurel Run.

EF-2

Young of year (YOY) native brook trout found in Laurel Run (above). Older native brook trout found in Laurel Run (below).

Description: Site EF-2 is located off of Gomer Hollow Road (now called Paso Fino Road). GPS coordinates are latitude 39.77982° and longitude -78.8749°. The stream length sampled was 80 meters, with an active channel width of eight meters. This location contained a plunge pool along with several undercut banks and overhanging vegetation, which increased available fish habitat. Substratum was comprised primarily of boulder and cobble, with small amounts of gravel and sand.

Fish Results: Six species of fish were collected at this location with slimy sculpin (*Cottus cognatus*) dominating the community by accounting for over half of the total individuals collected (48 of 94). The 13 brook trout collected in this reach comprised 13.8% of the total fauna recovered, with sizes ranging from 7.0 cm (2.76 inches) to 26.0 cm (10.24 inches), and an average trout weight of 0.087 lbs (Figure 6). Trout weights totaled 1.136 lbs, which extrapolated out to a biomass density of 7.19 lbs/acre (Table 2). This site had the highest density of brook trout sampled from Laurel Run.

EF-3

Description: Site EF-3 is located downstream of Shirley Hollow Road bridge. GPS coordinates are latitude 39.75164° and longitude -78.90253°. This section of stream was much closer to the headwaters and, as a result, had a smaller active channel width of only three meters. Electrofishing was conducted for

Table 2.

Brook trout biomass from single-pass electrofishing samples in Laurel Run.

Site	# Brook Trout	Total Trout Biomass (lbs/acre)	Total Biomass of Trout <15 cm (lbs/acre)	Percent Abundance of Site's Total Trout Biomass
EF-1	5	3.36	0.115	100%
EF-2	13	7.19	1.329	100%
EF-3	11	6.05	3.962	100%

Table 3.

Minimum biomass criteria for brook trout Class A Wild Trout Streams (Penn Future 2006). PFBC has separate criteria for total trout biomass and biomass of trout under 15 centimeters in length, allowing the reproductive health of the fishery to be incorporated into a stream's consideration for Class A status.

Total Trout Biomass (lbs/acre)	Total Biomass of Trout <15 cm (lbs/acre)	Percent Abundance of Total Trout Biomass as Brook Trout
26.7	0.089	75%

approximately 75 meters of stream length. Stream substrate is similar to the previous sites with a mix of small boulder and cobble.

Fish Results: Fish counts in this reach were half of what was found at previous sites. In addition to the lower counts, fewer species were collected, with only four being recovered. The slimy sculpin and brook trout were the most common species, similar to what was found at other sites in Laurel Run. Eleven brook trout were collected, with total lengths ranging from 6.0 cm (2.36 inches) to 16.0 cm (6.30 inches), and an average trout weight of 0.031 lbs, the lowest average weight of the three sites (Figure 6). Trout weights totaled 0.339 lbs for the sampled section, which equates to 6.05 lbs/acre (Table 2). This section of stream had no large trout, with the majority of fish smaller than 15 cm (5.9 inches).

EF-4

Description: Site EF-4 is located off of Sampson Rock Road south of the Pennsylvania border in Garrett County, Maryland. GPS coordinates are latitude 39.72085° and longitude -78.92307°. This section of stream was close to the source of the stream and, as a result, had a small active channel width of only one meter. The stream substrate was dominated by silt with a small amount of cobble and gravel.

Fish Results: No fish were found in this sampling reach, most likely due to the stream being too narrow, shallow, and silty to support fish. Because this site is high in the headwaters of the stream, almost at the source, it is not surprising that the stream is too small to provide fish habitat.

When comparing the brook trout biomass from the single-pass samples at each site (Table 2) to the criteria for Class A Wild Trout Streams (Table 3), it appears that all three of the sample sites fall below the required total trout biomass criteria. Whether or not Laurel Run meets the biomass criteria for a Class A Wild Trout Stream cannot be accurately determined from WPC's calculated brook trout biomass values, due to the fact that single-pass surveys were conducted instead of the triple-pass depletions typically required for quantitative biological surveys. Even with the single-pass sampling methodology, all three sites were found to meet and exceed Class A Wild Trout Stream criteria for biomass of

brook trout under 15 cm in length. A sufficient biomass of very young, small trout, especially young of year (YOY) trout, indicates that they are reproducing successfully.

Because a large portion of Laurel Run's brook trout biomass is comprised of small fish, it seems that the trout are experiencing healthy reproduction and recruitment rates between the younger age classes, but that few individuals are reaching the older age classes. This skew towards small trout is most pronounced at the uppermost sample site (EF-3). There are a few possible explanations for this dominance of small trout. Primarily, because the stream becomes smaller as one moves upstream, the habitat becomes less suitable for trout to grow to very large sizes. In addition, it is possible that some large trout and other fish are consuming the small trout, which, along with competition, is limiting the number of individuals who survive to grow to formidable sizes, especially upstream where habitat is less conducive to holding large trout. The removal of trout of legal keeping-size (7 inches or greater) through fishing could also be contributing to their scarcity.

Index of Biotic Integrity – Fish

IBI#1 rates both the fish assemblages of EF-1 and EF-2 as being in "good" condition, although EF-1 scores four points higher than EF-2. This condition category implies that the fish communities at these sites have:

> Species richness somewhat below expectation, especially due to the loss of some intolerant species; some species present with less than optimal abundances or size distributions; trophic structure shows some signs of stress (increasing frequency of generalist, white suckers and other tolerant species) (New Jersey DEP 2006).

IBI#2 rates the fish assemblage of EF-3 as being in "fair" condition, although its score places it at the upper limit for this condition category, so it may more accurately fall between "good" and "fair." The "fair" condition category is described as follows:

> Signs of additional deterioration include fewer species, loss of most intolerant species, highly skewed trophic structure (high frequency of generalist, white suckers and other tolerant species); older age classes of trout and/or top carnivores may be rare (New Jersey DEP 2006).

The results of these two IBIs are interesting because they assign different relative values of ecological health to the three fish-sampling sites in Laurel Run (Table 4). For example, IBI#1 rates EF-1

Table 4.

IBIs for each of the three sample sites in Laurel Run where fish were found. The condition categories (excellent, good, etc.) for IBI #1 come directly from the New Jersey DEP's document. IBI#2, however, did not assign specific condition categories to its range of scores, so the same categories are being used in order to allow qualitative comparisons between the two indices.

Site	IBI #1	IBI #2
EF-1	42	4
EF-2	38	5
EF-3	36	5

IBI #1 scoring range
45-50: Excellent 37-44: Good 29-36: Fair 10-28: Poor
IBI #2 scoring range
4-5: Excellent 3-4: Good 2-3: Fair 1-2: Poor

as being the best of the three, while IBI#2 rates EF-2 and EF-3 higher than EF-1. The disparity in the ratings given by these two indices lies in the fact that they place emphasis on different biometrics. IBI#1 incorporates many detailed, species-specific aspects of the richness, trophic composition, abundance, and condition of the fish assemblage, while IBI#2 considers only brook trout, sculpins, tolerant species, and abundance.

In general, the results of the electrofishing survey indicate that Laurel Run is home to a self-sustaining, naturally reproducing native brook trout fishery, as well as a diverse assemblage of other fish species. The abundance of YOY age-class brook trout indicates that the populations are experiencing sufficient reproduction and recruitment between the younger age classes. One possible shortcoming of the brook trout fishery is that few trout are growing to large sizes and surviving to reach the older age classes – an effect that becomes more pronounced upstream. The overall fish community of Laurel Run seems to be of good ecological health, with the IBI scores generally in the "good" range.

Redhorse sucker found during electrofishing survey.

Horned chubs found during electrofishing survey.

A comparison of past PFBC electrofishing data with WPC's results from 2006 seems to show that the fish species composition has changed over the years (Table 10, Appendix C). Several species found in the 1981, 1991, and 1995 surveys were not found in WPC's 2006 survey. It cannot be assumed that the absence of these species in WPC's electrofishing samples indicates their complete absence from the stream, because it is possible that the single-pass surveys missed some of these species and/or they occur in reaches of the stream that were not sampled. Regardless, the differences between PFBC's and WPC's survey results may be indicative of shifts in the relative abundance of various species and hence the composition and diversity of Laurel Run's fish community. A description of PFBC's sample site locations and in what years each was sampled can be found in Appendix C. Sites one, four, and five were close to WPC sample sites EF-1, EF-3, and MI-7; the other two PFBC sites were in areas where WPC did not sample.

Because WPC's electrofishing data and calculated IBI scores are based on single-pass surveys, any conclusions regarding the health of Laurel Run's fish communities must be made with caution because the data are not strictly quantitative. WPC's data is therefore most useful for general, qualitative analyses of Laurel Run's fish communities and comparisons between sample sites. A more in-depth electrofishing survey using triple-pass depletions at many sites along the stream would provide the quantitative data needed to make confident determinations regarding the health of Laurel Run's brook trout populations and overall fish community.

Macroinvertebrate Results

WPC's macroinvertebrate sampling sites (Figure 5) were at the following locations:

MI-1 is located near the mouth of Laurel Run, above electrofishing site EF-1. GPS coordinates are latitude 39.80832°N and longitude -78.86005°W.

MI-2 is located between electrofishing sites EF-1 and EF-2, less than halfway between the mouth of Laurel Run and where McKenzie Road ends. GPS coordinates are latitude 39.79764°N and longitude -78.86848°W.

MI-3 is located off of Gomer Hollow Road, downstream of the area containing a residence and horse pasture. GPS coordinates are latitude 39.77213°N and longitude -78.8856°W.

MI-4 is located downstream of where Cumberland Highway (Route 160) crosses Laurel Run. GPS coordinates are latitude 39.7631°N and longitude -78.8928°W.

MI-5 is located downstream of where Shirley Hollow Road crosses Laurel Run, just above electrofishing site EF-3. GPS coordinates are latitude 39.75101°N and longitude -78.90212°W.

MI-6 is located off of Shirley Hollow Road, downstream of where the Big Savage Tunnel bike trail crosses Laurel Run. GPS coordinates are latitude 39.74702°N and longitude -78.89676°W.

MI-7 is located above the most-downstream crossing of the triangle-shaped trail off of Old Mount Savage Road, about halfway between electrofishing sites EF-3 and EF-4. GPS coordinates are latitude 39.7335°N and longitude -78.9092°W.

MI-8 is located just north of the Maryland border, downstream of electrofishing site EF-4. GPS coordinates are latitude 39.72353°N and longitude -78.92037°W.

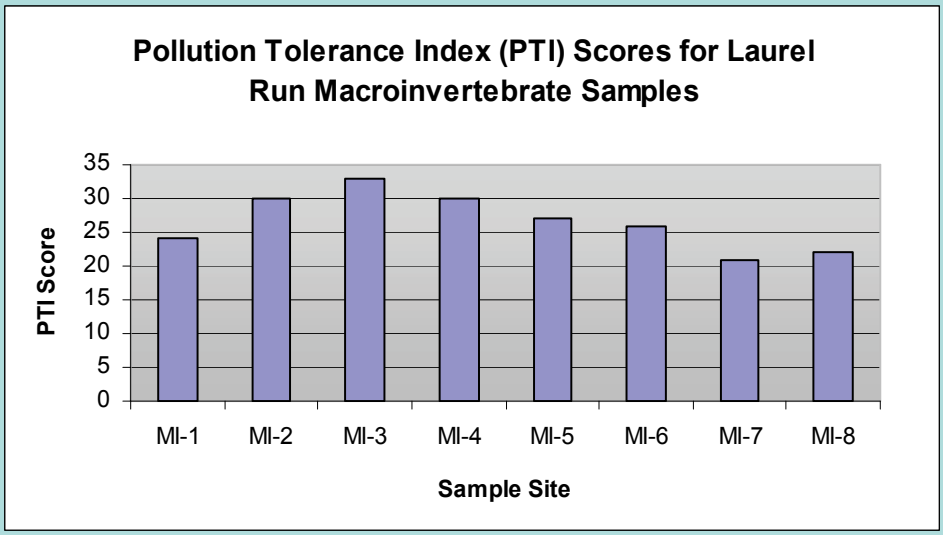


Figure 7.
Pollution Tolerance Index (PTI) scores for macroinvertebrate communities at each sample site. The PTIs were in the "excellent" range for sites MI-1 through MI-6, and in the "good" range for MI-7 and MI-8.

The macroinvertebrate samples collected at these eight sites in Laurel Run revealed an overall abundant, diverse community with a high percentage of pollution-sensitive taxa, such as mayflies, stoneflies, and caddisflies (Table 6). Every sample site except MI-7 had a high percentage of these pollution-sensitive EPT taxa. The PTI yielded a rating of "excellent" (24 or greater) for sites MI-1, MI-2, MI-3, MI-4, MI-5, and MI-6, and a rating of "good" (greater than 17 but less than 24) for sites MI-7 and MI-8 (Figure 7).

Upstream view of sample site MI-2, on April 19, 2007.

Index of Biotic Integrity - Macroinvertebrates

The macroinvertebrate IBI score and percentage of EPT taxa for each sampling site are shown in Figure 8. IBI scores ranged from 63.1 to 81.6, out of a maximum possible score of 100. A side-by-side comparison of each site's EPT taxa percentage with its IBI score helps illustrate the close relationship between a stream's ability to support pollution-sensitive macroinvertebrates and its overall biological integrity. These two scores were quite similar for every site except MI-7, which had an EPT taxa percentage of 31 – substantially lower than its IBI score of 63.1. This site partially makes up for its lack of abundant EPT populations by having comparatively higher **taxa richness** and **diversity**, two parameters that help keep its IBI score relatively high, albeit not as high as the other seven sample sites.

In conjunction with the development of their benthic macroinvertebrate IBI, PADEP established benchmark IBI scores for the assessment of Aquatic Life Use (ALU) attainment in wadeable, freestone streams (Table 5). According to these values, a stream designated by PADEP as EV or HQ, such as Laurel Run, should have a macroinvertebrate IBI score of 80.0 or higher, and a stream designated as a CWF, Trout Stocked Fishery (TSF), or Warm Water Fishery (WWF) should have an IBI of 63.0 or higher.

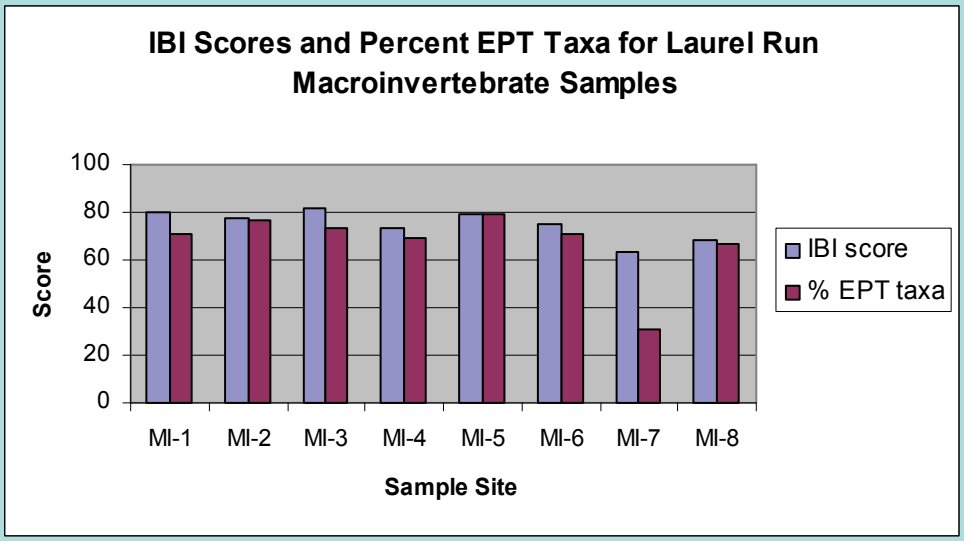


Figure 8.
IBI scores and percent EPT taxa for macroinvertebrate communities at each sample site in Laurel Run.

Laurel Run sites MI-1 and MI-3 were found to meet and exceed the IBI benchmark value of 80.0 for EV and HQ streams, and MI-2, MI-4, MI-5, and MI-6 had IBIs close to, but just under, this benchmark. Sites MI-7 and MI-8 had somewhat lower IBI scores of 63.1 and 68.7, respectively.

Taking into consideration the PTI scores, EPT taxa percentages, and IBI scores for the eight sample sites, the large majority of Laurel Run's benthic macroinvertebrate communities support its standing as a stream of high biological quality. (See Appendix D for information about HQ and EV designations.) Sites MI-7 and MI-8, however, are exceptions to this overall conclusion. The macroinvertebrate samples from both MI-7 and MI-8 had PTI ratings of "good" rather than "excellent," their IBI scores were considerably below the PADEP benchmark for HQ and EV streams, and the percentage of EPT taxa at site MI-7 was much lower than at the other seven sites. Furthermore, these lower IBI and PTI scores could be partially attributed to the decreasing suitability of macroinvertebrate habitat as the width of Laurel Run narrows upstream, which is a natural characteristic of a stream's headwaters. Therefore, while sites MI-7 and MI-8 cannot be expected to have macroinvertebrate communities with the same high diversity and associated IBI and PTI scores as the downstream sites, it is nevertheless worth considering any possible impairments near these sample sites in Laurel Run's headwaters.

Table 5.

Aquatic Life Use attainment benchmarks established by PADEP.

Protected use	IBI scoring benchmark
Exceptional Value (EV), High Quality (HQ)	$\geq$ 80.0
Cold Water Fishery (CWF)	$\geq$ 63.0 Supporting use
Trout Stocked Fishery (TSF)	
Warm Water Fishery (WWF)	

Possible impairments near site MI-7 include erosion and sediment from the trail crossing the stream. Further upstream, near site MI-8, possible impairments include the narrow riparian zone on the east bank for approximately one-quarter mile of the stream, and some recent logging south of the Pennsylvania border in Garrett County, Maryland. While the headwater macroinvertebrate samples at sites MI-7 and MI-8 are not of as high ecological quality as the downstream samples, they can still be characterized as "good" from their PTI and IBI scores. The possible impairment sources, therefore, do not appear to be severely affecting the stream's biological health, but are nonetheless worth considering for future conservation efforts in Laurel Run's headwaters.

Upstream view of Shirley Hollow Road bridge, above sample site MI-5 .

In general, the majority of Laurel Run was found to have a diverse benthic macroinvertebrate community dominated by pollution-sensitive organisms indicative of excellent water quality. This community is facilitated by favorable instream habitat features, such as abundant cobble, boulders, and gravel with minimal silt, the intact riparian zone that provides adequate shading, and the woody debris and leaf packs that serve as an energy source for macroinvertebrates. The macroinvertebrates and small fish at the bottom of the food chain are the food source for fish, such as the native brook trout, that are an economic and ecological asset to Laurel Run. Any enhancement efforts for brook trout and other fish are inextricably linked to the protection of water quality and stream habitat for benthic macroinvertebrates. Both must be given proper consideration for the long-term stewardship of Laurel Run's biological resources.

Table 6.

Abundance of benthic macroinvertebrate taxa found at eight sample sites in Laurel Run.

Order	Family name	Common name	MI-1	MI-2	MI-3	MI-4	MI-5	MI-6	MI-7	MI-8
Insects *(class Insecta)*										
Ephemeroptera (mayfly)	Ephemerellidae	Spiny crawler	44	77	57	56	19	13	2	1
	Baetidae	Small minnow	16	31	24	19	35	29		6
	Baetiscidae	Armored			1					
	Ephemeridae	Common burrower		1	1	6				
	Heptageniidae	Flatheaded	22	41	52	63	69	84	2	1
	Leptophlebiidae	Pronggilled	1							
Plecoptera (stonefly)	Capniidae	Small winter	2	2			5	10		
	Chloroperlidae	Green	24	22	16	11	14	10	7	13
	Leuctridae	Rolledwinged			3	5	4	20	4	14
	Nemouridae	Nemourid	1					6	19	41
	Perlidae	Common	1		5		6	1	6	30
	Perlodidae	Perlodid	9	15	12	16	5	7	1	4
	Pteronarcyidae	Giant					4	1		
	Juvenile stoneflies, family not identified									45
Trichoptera (caddisflies)	Brachycentridae	Humpless case maker		1		1				
	Glossosomatidae	Saddlecase maker	1							
	Helicopsychidae	Snailcase maker	1							
	Hydropsychidae	Common netspinner	5	12	38	16	49	20		2
	Hydroptilidae	Micro							1	
	Lepidostomatidae	Lepidostomatid case maker	2							
	Limnephilidae	Northern case maker	5	20	11	8	8	8	17	2
	Philoptamidae	Fingernet			2		4		1	
	Polycentropodidae	Trumpetnet/ Tube-maker		3		7	15	19	8	
	Rhyacophilidae	Freeliving							5	
Diptera (true flies)	Athericidae	Aquatic snipe fly			3		2		1	
	Ceratopogonidae	Biting midge	2		2		1	1		
	Chironomidae	Midge	22	23	32	36	16	25	106	40
	Dolichopodidae	Longlegged Flies	2							4
	Empididae	Dance fly	2	1	7	10	1	5	3	
	Simuliidae	Black fly	8	2	1	4	6	4	6	8
	Tabanidae	Horse/deer fly	2	1	8	1	2		1	11
	Tipulidae	Crane fly		14	8	14	10	28	41	3
Coleoptera (water beetles)	Dytiscidae	Predaceous diving beetle	1			1				
	Elmidae	Riffle beetle	2	5	11	19	23	21	2	
Lepidoptera		Aquatic moth						1		
Megaloptera	Corydalidae	Dobsonfly	2	3	2	1	1			
	Sialidae	Alderfly			1					2
Odonata	Gomphidae	Clubtail dragonfly			1					
Non-insects:										
Bivalvia (class)	Sphaeriidae	Fingernail clam				2		3		2
Crustacea (class) Isopoda (order)	Asellidae	Sow bug		7						
Decapoda	Cambaridae	Crayfish	1	1	1				2	2
Gastropoda (snails)	Bithyniidae	Gilled snail								
	Physidae	Pouch snail			2					
Arachnida (class) Acariformes (order)	"Hydracarina" (group)	Water mite			1					
Annelida (phylum) Oligochaeta (class)		Aquatic earthworm	10	9	1	7	1	5	4	7
Site totals			**188**	**291**	**303**	**303**	**300**	**321**	**239**	**238**

Water Chemistry Results

WPC's water quality results were compared with benchmark values established by PADEP in Chapter 93 of the PA Code or other sources, if available (Table 7). These water quality criteria are associated with critical uses such as CWF, HQ-CWF, and PWS. For each water quality criterion, the existing critical use that is most applicable to Laurel Run is listed.

Table 7.

Comparison of water chemistry results from Laurel Run with criteria established by PADEP in Chapter 93 of the PA Code, if available. All parameters except phosphates were found in concentrations below the maximum recommended levels.

Water Chemistry Parameter	Chapter 93 Criteria	Critical Use	Laurel Run range
Conductivity	None**	*N/A*	28 – 75 µS/cm
Dissolved Oxygen	Minimum 7.0 mg/L	HQ-CWF	9.3 – 11.6 mg/L
Nitrates	Maximum 44 mg/L	PWS	3.9 – 10.1 mg/L
pH	6.0 – 9.0 inclusive	CWF	6.1 – 7.8
Phosphates	Maximum 0.1 mg/L*	N/A	0.1 – 0.34 mg/L
Temperature	Maximum 52°F (April 16-30)	CWF	42.3 – 44.9°F (April 19)
Total Dissolved Solids	500 mg/L monthly average, Maximum 750 mg/L	PWS	20 – 50 mg/L
Turbidity	None**	*N/A*	0 to 3 FAU

** Criterion for phosphates established by USEPA for the control of eutrophication. PADEP does not have an established criterion for phosphates.*
*** PADEP does not have established criteria for conductivity or turbidity.*

Upstream view near sample site MI-7 on April 19, 2007.

The only water chemistry parameter that was measured at levels higher than its recommended criterion was phosphates (Figure 9). The highest phosphate concentration was 0.34 mg/L and was found at site MI-3, which is just downstream of the horse pasture adjacent to a house and mowed lawn off of Gomer Hollow Road. Runoff from lawn fertilizers and horse manure could have been contributing phosphates to the stream at this point, possibly exacerbated by the recent rainy weather and consequent high-flow levels of Laurel Run. If the horse pasture and lawn are in fact contributing phosphates to the stream, this effect diminishes downstream, where concentrations decrease to 0.24 mg/L at site MI-2 and 0.1 mg/L at MI-1. The somewhat elevated phosphate level at site MI-3, therefore, does not seem to have an overall effect on Laurel Run's water quality.

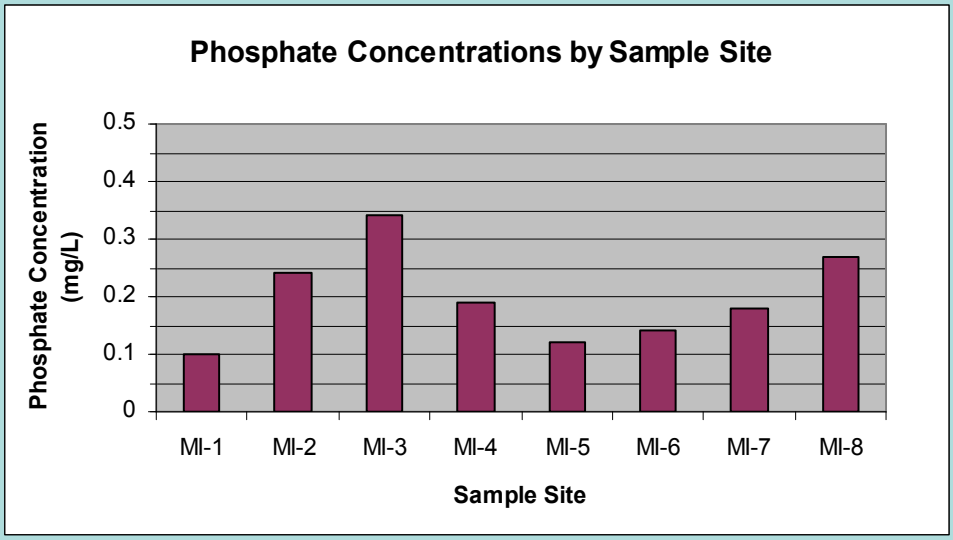


Figure 9.
Concentrations of phosphates measured at each sample site in Laurel Run. Site MI-3 had the highest phosphate concentration, exceeding USEPA's 0.1 mg/L maximum recommended level by 0.24 mg/L.

Public Input

On November 9, 2006, 33 people attended a public meeting to discuss the Laurel Run Coldwater Conservation Plan. The attendees were very interested in learning about the details of the project, and actively participated in the discussion following the project presentation. These watershed residents asked many questions about the components and possible outcomes of the project, and voiced several concerns and personal suggestions for the conservation plan.

One of the prevailing concerns of the meeting attendees was over-fishing in Laurel Run – several people advocated implementing a catch-and-release restriction to help protect the native brook trout population. There was a general consensus that the brook trout fishery was not as good as it used to be, although it still is a prime fishing resource. WPC's electrofishing survey lends support to attendees' perceptions, finding that Laurel Run contains substantial populations of small, young brook trout but lacks large populations of large, older age-class brook trout. The desire to maintain Laurel Run as a local recreational resource, rather than publicizing its brook trout fishery in an attempt to gain support for its protection seemed to be a unifying belief of the attendees. They were opposed to improving public access to Laurel Run. These viewpoints stemmed from the desire to prevent an influx of new anglers and the associated over-fishing that would result, in order to keep Laurel Run as pristine as possible and

protect the brook trout populations, which WPC agrees should be a priority for the stream. Various angles of this issue were discussed, especially the idea that public awareness of Laurel Run could be both an asset and a hindrance to its protection.

Local volunteers and WPC and SCD staff identifying fish during an electrofishing survey.

Additional concerns that arose during the discussion were erosion and flooding. According to meeting attendees, these problems are most prevalent toward the mouth of Laurel Run, and the worsening of the problem in recent years warrants bank stability improvements. One person suggested that some landowners have lost as much as 30 to 40 feet of their property in the last five to ten years. A few landowners have built their own structures along the stream to protect their property, and WPC staff did notice two such structures during its visual assessment. WPC staff suggested that it is important to keep in mind that some erosion is normal because streams are dynamic, constantly developing entities, and that the most natural way to minimize erosion is to maintain as much vegetative cover as possible along the streambanks and riparian zone.

Another attendee made the contrasting observation that the current water level in Laurel Run was the lowest that he had seen in many years, and WPC's visual assessment in October did note that the stream was well below its bank-full capacity. A likely conclusion from these opposing observations is that local weather patterns in recent years have created extremes in Laurel Run's water levels; longer periods of drought have been counteracted by short, heavy rainfall events capable of producing the reported increase in flood events and subsequent erosion in recent years. In addition, groundwater removal for homes outside of the watershed could be contributing to the low water levels during drought periods.

A few watershed landowners expressed concern over a footbridge that was built over the stream about halfway between the mouth of Laurel Run and Gomer Hollow Road in SGL 82, stating that this man-made structure does not belong in the stream's natural setting.

Each attendee was asked to complete a short survey at the beginning of the meeting. Most people identified themselves as a landowner in the Laurel Run watershed and/or someone that enjoys hunting or fishing in the area. These surveys also revealed some common concerns and viewpoints for the conservation of the stream. One survey question listed possible concerns for future activities in the watershed, and the attendees were asked to rank these issues from one to eight, according to their level of concern with each. Among those who completed this question, the most widespread issue of concern was poor forestry practices, followed by impacts from development and changes in the forested landscape and way of life.

By averaging the importance rankings that the attendees reported for each issue, it is evident from the survey results that the meeting attendees place importance on the following issues, listed from greatest to least priority:

Priority ranking	Issue of Concern
1	Poor forestry practices
2	Impacts from development
3	Change in forested landscape and way of life
4	Over-fishing in Laurel Run
5	Poor agricultural management practices
6	Droughts causing lower water levels
7	Lack of access for fishing or hunting
8	People telling me what to do with my land, or trespassing on my land
	Other: Logging, windmills, footbridge

In general, the results of these surveys and subsequent communications with landowners revealed that the majority of the people who attended the meeting are mindful of the ecological value and relatively pristine setting of Laurel Run. Their substantial interest in the future of the stream seems to stem from a genuine appreciation of the watershed's recreational value for fishing and hunting, in addition to the fact that several of them own property or camps within the watershed. These people place great value on natural, forested landscapes and undisturbed waterways, and are very concerned with keeping Laurel Run in its natural state.

Footbridge located within the Laurel Run watershed.

Many meeting attendees noted on their survey that they were interested in volunteering for the project, further demonstrating their enthusiasm and commitment to the conservation of Laurel Run. While these generalizations can only be strictly applied to the 33 local residents and landowners who attended the meeting, it is reasonable to assume that they are representative of a large majority of the watershed community.

A community that seems to be passionate about conserving Laurel Run as a recreational and ecological resource will be instrumental in future conservation and protection efforts.

Conclusions

This Coldwater Conservation Plan is unique in that its focus is on a stream in a relatively pristine setting, geographically distant from any serious impacts from mining, development, urbanization, or point-source pollution. Rather than seeking to mitigate any severe water quality issues, the main objectives of this plan have been to assess Laurel Run's status as a native brook trout stream of exceptional ecological quality, identify any mildly impacted areas worth considering for future conservation efforts, and provide a document to help citizens be responsible stewards of the Laurel Run watershed. A study documenting the physical and biological conditions of the stream provides an up-to-date, scientific basis for the value in protecting this aquatic resource.

Because the Laurel Run watershed has many outstanding features and few notable water quality problems, the overriding recommendations that can be made from this study should focus on protection. The most effective future efforts will stem from a vigilant, conservation-minded community that is willing to be active and take personal responsibility for maintaining and even improving the physical and biological merits of Laurel Run, such as the intact forested riparian zone, the wild brook trout populations, and the general undisturbed rural setting of the watershed. There are several strategies that landowners and recreational users within the watershed can employ to help maintain these qualities of the Laurel Run watershed (see Recommendations).

Table 8.

Key sections of Laurel Run for future conservation and restoration efforts.

Stream Segment	Potential Impacts	Remediation Strategies
Lower section of stream above mouth.	Narrow riparian zone on left (east) side of stream in a few areas.	· Educate landowners about importance of streamside vegetation. · Riparian planting.
Light agricultural operations (horse pasture areas) and lawns with limited riparian zone.	Phosphate concentration above USEPA recommended level at site MI-3, possibly from horse manure and lawn fertilizer runoff.	· Install best management practices on horse pasture. · Educate landowners about nutrient management strategies and minimizing fertilizer use. · Riparian planting.
Upper section of UNT between Porter Road and Route 160, in marginal, fenced cow pasture.	Little to no riparian zone, excessive multiflora rose on streambanks.	· Riparian planting. · Invasive plant control. · Educate landowner about ways to create and maintain healthy streams.
Headwaters south of Pennsylvania-Maryland border.	Limited riparian zone on left (east) side of stream, recent logging on right (west) side, silty substrate, small pond with no riparian zone.	· Educate landowners about importance of streamside vegetation. · Riparian planting.

By reviewing WPC's results from the visual stream assessment, electrofishing survey, and macroinvertebrate and water chemistry sampling, it can be concluded that Laurel Run is indeed a stream of excellent biological, recreational, and aesthetic value and should be protected as much as possible. The Laurel Run watershed is not completely devoid of potential problems, however, and this conservation plan comes at an opportune time to increase awareness of such issues and take preventative action so that that they do not worsen and pose water quality threats. Table 8 lists stream sections and potential problems that are worth considering for conservation efforts, as well as possible remediation strategies and funding sources. Table 9 lists stream sections that should be key protection areas in Laurel Run due to their high ecological quality and/or pristine setting.

Table 9.

Key protection areas for Laurel Run.

Stream Segment	Description	Protection Strategies
In SGL 82 above mouth of Laurel Run, between where camps and TR-760 trail end and sample site MI-2.	Pristine setting, dense deciduous and coniferous forest, stream substrate of bedrock slabs and boulders, very steep rock walls on left (east) side of stream.	Protect forest. Maintain low accessibility: do not extend roads. "Smart-growth" development to maintain pristine setting.
Along Shirley Hollow Road, between sample site MI-5 and MI-6.	Beginning of EV and WTS portion of Laurel Run, highly forested.	"Smart-growth" development: aided by EV status. Dirt and gravel road maintenance to protect water quality.
Headwaters between triangle-shaped trail off of Old Mount Savage Road and source of stream, which includes sample sites MI-7 and MI-8.	Almost completely forested until south of Pennsylvania border.	Protect and improve forest. Landowner education. Focus protection of Laurel Run on headwaters.

An eastern garter snake observed during the assessment.

Possible Funding Sources

Public Sources

DCNR – The Pennsylvania Department of Conservation and Natural Resources provides funds for Rivers Conservation Plans.
PADEP – Pennsylvania Department of Environmental Protection, Growing Greener Program and others.
PFBC – Pennsylvania Fish and Boat Commission, Adopt-a-Stream Program and others.
PGC – Pennsylvania Game Commission manages activities in State Game Lands. The lower part of Laurel Run watershed is within SGL 82, which is in PGC's Southwest Region, District 4.
RC&D – Resource Conservation and Development Council, part of the USDA. Currently developing a Weed Control/Wildlife Habitat Technical Assistance program, which provides technical assistance for weed control and wildlife habitat improvements for landowners enrolled/involved with CREP.
USDA – United States Department of Agriculture. Various programs including the Conservation Reserve Enhancement Program (CREP), the Environmental Quality Incentives Program (EQIP), and others.
USEPA – United States Environmental Protection Agency.
Garrett County Forestry Board – One of Maryland's 24 Forest Conservancy District Boards, promotes sound forest management practices and conservation of forest resources in Garrett County, Maryland.
MDE – Maryland Department of the Environment.
Maryland DNR Forest Service

Private Sources

The Chesapeake Bay Foundation – Dedicated solely to restoring and protecting the Chesapeake Bay and its tributary rivers.
National Fish and Wildlife Foundation – Chesapeake Bay Small Watershed Grants Program.
The Western Pennsylvania Watershed Program – Fosters the work of small, locally based watershed organizations and links them to the larger, regional watershed organizations that are responsible for the DCNR Rivers Conservation Planning process.

Possible Partners

SCD – The Somerset Conservation District works closely with conservation organizations, resource management agencies, farm organizations, sportsmen's groups, and the general public to promote erosion and sediment pollution control practices, conservation planning, water-quality improvement, land-use planning, and environmental education. SCD is a local partnering organization for nutrient management plans under the PA Act 38 Program and projects funded by the PA Dirt and Gravel Road Program.
GSCD – Garrett Soil Conservation District
WPC – Western Pennsylvania Conservancy
TNC – The Nature Conservancy

Listed funding and partner sources are not meant to be comprehensive and all efforts should be made to explore other public and private sources.

Recommendations

Implement Proper Forestry Practices

Maintaining Laurel Run's intact forested setting is crucial to protecting the watershed for several reasons. A forested riparian zone with dense canopy cover shades the stream from the sun's warming rays, allowing the cold water temperatures required for brook trout survival. Any future fishing regulations focused on wild brook trout protection can be effective only if the brook trout's basic habitat requirements, such as the cold water temperatures, continue to be met. To ensure that Laurel Run's dense forest cover remains intact, timber harvesters and private landowners should utilize best management practices for any future timbering activities, as outlined in Penn State University's Sustainable Forestry Guide. While a broad, forested riparian zone is characteristic of the large majority of the watershed, tree-planting practices could be considered for a few areas having narrow or sparsely forested riparian zones.

Stabilize and Properly Maintain Dirt and Gravel Roads

Of the 9.5 miles of roads in the Laurel Run watershed, 6.57 miles, or 69 percent, are dirt and gravel (D&G) roads. Best management practices for D&G roads help reduce the amount of sediment and other pollutants that reach nearby streams. McKenzie Road (TR-361), which provides access to the mouth of Laurel Run, currently has conveyer belt diversions that appear to be effectively preventing erosion and sedimentation to a nearby tributary to Laurel Run. Efforts should be made to ensure that this road and conveyor belt diversions are properly maintained, and additional projects could be considered for a few other roads within the watershed. Sediment from D&G roads does not appear to be a current impairment to the Laurel Run watershed, so environmentally sound maintenance of these roads is important to prevent sedimentation problems in the future. Pennsylvania's Dirt and Gravel Road program allocates funds to Pennsylvania counties for D&G road projects, which are then distributed by the conservation districts for projects in individual municipalities. According to SCD, improvements have been completed for 1.57 miles of D&G roads within the Laurel Run watershed, and approximately five additional miles of roads have been identified as potential sites for the program.

Limit Impervious Cover

Total impervious cover makes up approximately two percent of the Laurel Run watershed. Types of impervious cover that currently exist in appreciable amounts within the watershed include paved roads (about 35 percent) and D&G roads (about 65 percent). Increases in impervious cover have detrimental effects on a stream's water quality and biological communities, and brook trout are particularly sensitive to the resulting runoff and higher water temperatures. Therefore, limiting the amount of impervious cover is very important to maintaining Laurel Run's high biological quality. Ideally, for the protection of biological communities such as fish and macroinvertebrates, the construction of any additional roads, especially close to the stream, should be avoided if possible.

Protection of Headwaters

A common and useful approach to watershed protection and restoration is to focus on a stream's headwaters, which are the origin of a stream's hydrologic system and therefore critical to the health of downstream waters. Water-quality impacts downstream are much more easily mitigated if the quality of the headwaters is maintained. The EV status of the upper portion of Laurel Run is very useful

in a protection approach focused on headwaters, because any future development in this area will not be permitted unless best management practices (BMPs) are properly employed to maintain water quality. Any conservation and protection efforts in the small portion of the headwaters in Garrett County, Maryland would require coordination with local government entities and the Maryland Department of the Environment (MDE).

Wild Brook Trout Enhancement Program

The Wild Brook Trout Enhancement program (WBTE) is a special trout-fishing regulation recently created by PFBC through an amendment to Title 58, Chapter 65 of the PA Code, which went into effect on January 1, 2004. It focuses on reducing the harvest of brook trout in waters dominated by wild brook trout (as opposed to a combination of brook and brown trout), in order to enhance the abundance of larger, older wild brook trout in these streams. Killing or being in possession of brook trout is prohibited in any stream with this designation, and fishing is allowed year-round with no tackle restrictions. All other trout species will be under conventional seasons, sizes, and creel limits (PFBC 2007). Streams in this program require a current trout/salmon permit.

Brook trout collected during electrofishing.

While the native brook trout populations in Laurel Run appear to be abundant, there were not very many large, older brook trout found in the electrofishing survey. Over-fishing was one of the main concerns expressed by local residents who attended the public meeting, so this regulation would likely receive a great deal of public support. This program has possible advantages over other catch-and-release regulations in that it is the least restrictive – it applies to brook trout only, all types of tackle are permitted, and fishing is permitted year-round and at any time of the day.

PFBC plans to evaluate the effectiveness of the WBTE program by conducting surveys comparing brook trout streams managed with this regulation with control streams managed under statewide regulation. Until this evaluation stage is complete, PFBC does not anticipate adding any new streams into the program (David Miko – Area 7 Fisheries Manager, personal communication). This regulation is therefore not a likely option for Laurel Run in the very near future, but might be worth considering for the long-term management of its wild brook trout population.

Catch and Release Regulations

Killing or being in possession of any trout is prohibited in streams managed under PFBC's Catch and Release restriction. These streams are open to fishing year-round with no closed season, from one hour before sunrise to one hour after sunset. The basic version of this regulation allows fishing with artificial lures only (including spinning or fly-fishing gear); natural bait is prohibited. There is an All Tackle version of the Catch and Release regulation, which is less restrictive in that it allows fishing with artificial lures, flies, and natural bait, and does not limit the time of day during which fishing is allowed. All Catch and Release waters require a current trout/salmon permit.

There are various points to consider when looking at potential PFBC fishing regulations for Laurel Run. Several people who attended the public meeting advocated the implementation of a Catch and Release restriction, stemming from their concerns with over-fishing. Catch and Release prohibits the taking of any trout species, while the WBTE only applies to brook trout. Because the native brook trout seems to be the primary conservation concern for anglers and other watershed stakeholders, it might not be desirable to prohibit the removal of other trout species, such as the brown trout, that compete with the brook trout. The WBTE program might therefore be more appropriate for the stream; however, because it is still in the evaluation phase, it is unlikely that Laurel Run or any other streams will be considered for this program in the near future. Still, it is worth considering as a long-term goal. PFBC would be more likely to consider Laurel Run for a Catch and Release regulation, which has been in existence longer than the WBTE program. Such a regulation would likely invoke both public support and opposition.

Streambank Fencing and Riparian Buffer Improvement

Laurel Run would benefit from streambank fencing and riparian buffer improvements in the horse pasture areas. This would help ensure that horse manure stays away from the stream to reduce the potential for nutrient contamination, and have the added bonus of allowing an improved riparian zone (through natural vegetation regeneration and/or tree-planting) to help stabilize the streambank and control erosion.

Landowner Education

One of the most effective and necessary tools for addressing watershed problems is landowner education. Several public meeting attendees voiced concern over erosion problems, especially in the lower part of Laurel Run, and bank stabilization was mentioned as a possible solution. It is important to keep in mind that one of the best strategies for stabilizing streambanks is to maintain vegetative cover in the riparian zone. There a few areas in the lower half of Laurel Run where the riparian zone is limited because landowners are mowing close to the stream and/or have horse pasture. These landowners should be made aware of the need for trees along streambanks and given information about programs that can assist with planting. Furthermore, these landowners can help reduce erosion simply by not mowing so close to the stream in order to maintain a vegetated buffer.

Petition for Reclassification

Local groups may consider petitioning PADEP for a re-evaluation of Laurel Run's EV and HQ-CWF designations based on current biological data. PADEP would complete its own investigation to determine the most appropriate designations for Laurel Run. See Appendix D for more information about stream redesignation.

Continued Monitoring

Periodic monitoring of the water quality and fish and macroinvertebrate communities should be conducted to establish more baseline data for Laurel Run and to detect any future changes that might be indicative of water quality issues. In particular, summertime water temperature monitoring should be conducted to make sure that the temperature remains cold enough for native brook trout, which WPC was unable to analyze due to the timing of sampling. Volunteers could be enlisted to assist with temperature monitoring and other periodic sampling.

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APPENDIX A

Explanation of Terms

Key to Acronyms

CHP = Coldwater Heritage Partnership

CWF = Cold Water Fishery

DCNR = Pennsylvania Department of Conservation and Natural Resources

EV = Exceptional Value

EPT = Ephemeroptera, Plecoptera, Trichoptera

GPS = Global Positioning System

HQ-CWF = High Quality Cold Water Fishery

IBI = Index of Biotic Integrity

PADEP = Pennsylvania Department of Environmental Protection

PFBC = Pennsylvania Fish and Boat Commission

PGC = Pennsylvania Game Commission

PTI = Pollution Tolerance Index

SCD = Somerset Conservation District

SGL = State Game Lands

USDA = United States Department of Agriculture

USEPA = United States Environmental Protection Agency

WBTE = Wild Brook Trout Enhancement Program

WPC = Western Pennsylvania Conservancy

WTS = Wilderness Trout Stream

YOY = Young of Year

Glossary of Terms

Benthic – Refers to the bottom, substrate area of the stream, and/or organisms inhabiting this zone.

Biomass – The amount of living matter in an area of habitat. In this document, biomass of brook trout is expressed as the weight in pounds per acre of stream habitat.

Conglomeratic – Refers to a rock composed of rounded pebbles or stones which are cemented together by another rock matrix type, such as sandstone or limestone.

Coniferous – Trees or shrubs bearing cones and evergreen leaves.

Deciduous – Trees and shrubs that shed their leaves annually, such as maple, oak, beech, birch, cherry, and others.

Evergreen – Trees and shrubs having foliage that persists and remains green throughout the year, such as pines, spruces, hemlocks, rhododendron, and others.

EPT – Refers to macroinvertebrates in the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). A high percentage of EPT taxa in a benthic stream sample usually indicates good water quality, as these macroinvertebrates are generally sensitive to pollution.

Eutrophication – *see Nitrates and Phosphates.*

Index of Biotic Integrity (IBI) – Originally developed by Dr. James Karr for use in small warm-water streams. The IBI is a multimetric index used to assess a stream's biological integrity, which can be defined as, "the ability to support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity and functional organization comparable to those of natural habitats within a region" (Karr and Dudley 1981). Different versions of the IBI have been developed for different geographic regions and ecosystems (i.e. cold-water streams instead of warm-water streams), and various IBIs are now available for fish, macroinvertebrates, and algae. In this document, two different fish IBIs and one macroinvertebrate IBI are used to assess the biological integrity of Laurel Run.

Land use – The activity for which an area of land is used, such as grazing pasture, row crops, forest, residential, conservation reserve, and industry.

Macroinvertebrate – An invertebrate animal (lacking an internal skeleton) that is large enough to be seen without magnification. In this document, the term more specifically refers to small freshwater insects, crustaceans, mollusks, and worms that inhabit the stream, usually attached to substrate or buried in sediment in the benthic zone of the stream.

Riparian zone – The land immediately surrounding a stream or river. Maintaining a forested riparian zone is vital to protecting the physical integrity and water quality of a stream.

Stratigraphy – A branch of geology dealing with the classification, nomenclature, correlation, and interpretation of stratified rocks.

Surber sampler – A quantitative sampling tool for stream benthic invertebrates, consisting of a rectangular steel frame with an attached fine-mesh net.

Syncline nose – The nose-shaped tip of a syncline. A syncline is a fold in a rock structure that is shaped like a basin or trough.

Taxa – A term referring to a certain category of organisms, which can range from very general, such as the organism's class name (i.e., all insects are in the class Insecta), to very specific (i.e., the species name for brook trout is *Salvelinus fontinalis).*

Taxa richness – The number of different taxa found in a sample. The number of different orders and/or families of macroinvertebrates are referred to in this document.

Taxa diversity – The variety of different taxa of organisms found in a sample, which takes into account both the number of different taxa (richness) and how evenly distributed the total number of organisms are among those taxa. In this document, Simpson's Diversity Index is used to quantify the taxa diversity of the stream macroinvertebrate samples.

Water Chemistry Parameters

Dissolved Oxygen (DO) – A measure of the amount of oxygen dissolved in water through diffusion from the atmosphere, aeration from water tumbling over rocks, and as a by-product of photosynthesis. High DO levels are beneficial to the fish and macroinvertebrate life in a stream. Water temperature and turbidity both affect DO levels; increasing water temperature and/or increasing turbidity will decrease DO concentrations.

Nitrates and Phosphates – High levels of these nutrients can cause increased algal and plant growth, which uses up dissolved oxygen when bacteria decompose the dead plant material. This process, known as **eutrophication**, is detrimental to fish and aquatic macroinvertebrates. These nutrients come from many sources, including livestock manure; fertilizers for agricultural fields, lawns, and golf courses; atmospheric nitrogen deposition; soil erosion; and discharges from sewage treatment plants.

pH – A scale used to express the acidity or alkalinity of the water and can range from 0 to 14, with 0 being the most acidic and 14 the most alkaline, and 7 indicating a neutral pH. Any pH very much above or below 7 may indicate a water-quality problem, such as acid mine drainage if the pH is very low (acidic), or a sewage problem if the pH is too high (alkaline). Some local variation in a stream's pH is normal, and could be caused by soil pH, limestone geology, and acid precipitation.

Total Dissolved Solids (TDS) and Conductivity – **TDS** is a measure of the total weight of inorganic solids dissolved in a given volume of water, such as calcium, chlorides, nitrate and phosphorus. TDS concentrations affect the water balance of cells in aquatic organisms. **Conductivity** is a measure of the ability of water to pass an electrical current, which is a function of the presence of ions of dissolved compounds, making it closely related to TDS. High levels of TDS and conductivity may result from natural geological sources, such as limestone and shale, but also may indicate water-quality problems from manure or fertilizer runoff, siltation, or industrial pollution.

Turbidity – A measure of the cloudiness of the water in a stream or other waterbody, which is a function of the amount of suspended solids that scatter light as it passes through the water. Turbid water absorbs heat and blocks light needed in photosynthesis, which can lower dissolved oxygen levels.

Volunteers and WPC staff prepare to sample site MI-1.

Appendix B

Common Laurel Run Fish Species

The following is a brief description of a few prevalent species found during WPC's electrofishing survey of Laurel Run on December 20, 2006. Descriptions are adapted from PFBC's reference book (Steiner 2006) and the Peterson Field Guide to Freshwater Fishes (Page and Burr 1991).

Brook Trout

The brook trout (*Salvelinus fontinalis)*, the official state fish of Pennsylvania, is the only stream trout that is native to the state. Wild populations are found in five of the six major watersheds in Pennsylvania; those watersheds being the Ohio, Susquehanna, Genesee, Potomac, and Delaware River watersheds. The brook trout naturally inhabits small, cold, clean streams that are well-oxygenated and small to medium rivers. It has also adapted to ponds and lakes. Land-use changes, mining, and warming and silting of streams has significantly diminished wild brook trout habitat. Naturally self-sustaining populations are still found in limestone spring-fed streams and cold, mountain creeks such as Laurel Run. Brook trout are relatively tolerant of acidic waters, but cannot withstand water temperatures much over 65 degrees Fahrenheit.

Brook trout spawn in the fall, from mid-September through November, and may travel upstream to the headwaters to find optimal spawning sites. Sexually mature fish in small streams may only reach four to five inches in length; most large brook trout caught by anglers in Pennsylvania are hatchery-stocked fish. Most wild brook trout are relatively short-lived, surviving less than five years in most cases. They feed on aquatic and terrestrial insects, crustaceans, and small fish.

Sculpin

The most abundant species found in Laurel Run was the slimy sculpin (*Cottus cognatus*). Most freshwater sculpins are small, bottom-dwelling fish that prefer cool, headwater streams such as Laurel Run. The slimy sculpin requires a clean, stony bottom and, like many typical prey species, can outnumber trout in a stream where the habitat is optimal. In Pennsylvania, this species is found in four of the six major watersheds: the Susquehanna, Delaware, Potomac, and Genesee River systems.

The mottled sculpin (*C. bairdi*) was also found in Laurel Run. This species typically cohabitates with brook and brown trout, but can also live in waters too warm for trout. The mottled sculpin lives in all of Pennsylvania's watersheds. Both slimy sculpin and mottled sculpin spawn in early spring.

Dace

The blacknose dace (*Rhinichthys atratulus*) is a small minnow species found throughout Pennsylvania's watersheds. They are especially common in mountain and spring-fed streams, and prefer moderate currents of the rocky runs and pools of headwaters and small rivers. They feed on tiny invertebrates, such as blackflies and midge larvae, on the stream bottom, as well as on diatoms and algae.

The longnose dace (*R. cataractae*) is the most widely distributed minnow species in North America, and is found in all of Pennsylvania's watersheds. The longnose dace and blacknose dace typically share the same streams, but utilize different habitats. The longnose dace prefers rubble and gravel riffles of cold or cool swift-flowing streams, most often trout streams in Pennsylvania. Unlike the blacknose dace, the longnose dace can also be found in the rocky shores of lakes. They spawn in the spring, from April into June, and feed on aquatic insects such as mayflies, blackflies, and midge larva.

Redhorse Sucker

The golden redhorse sucker (*Moxostoma erythrurum*) is abundant in some sections of the Allegheny River and is also found in Lake Erie tributaries. It is absent from most Atlantic Coast streams, with the exception of the Potomac River watershed in the south-central part of Pennsylvania, which includes Laurel Run. Golden redhorses live in the mud- to rock-bottomed pools, runs, and riffles of creeks and rivers, and occasionally in lakes.

The black redhorse sucker (*M. duquesnei*) is also plentiful in some sections of the Allegheny River. Unlike the golden redhorse sucker, the black redhorse has not been reported in the Potomac River watershed. However, two individuals of this species were found in Laurel Run during electrofishing. Black redhorse suckers live in sand- to rock-bottomed pools and runs of clear, cool creeks and small rivers, and in impoundments.

The redhorse suckers spawn in spring, and feed on a variety of small aquatic animals and plants on the stream bottom, such as snails, mollusks, midges, insect larvae, and algae.

Appendix C

Occurrences of Laurel Run Fish Species

PFBC Electrofishing Sites

Site #	Latitude	Longitude	Years sampled	Location
1	39.8089° N	-78.8600° W	1981, 1991, 1995	Mouth of Laurel Run, near WPC site EF-1.
2	39.7775° N	-78.8822° W	1981, 1991, 1995	Next to Gomer Hollow Road, between WPC sites EF-2 and MI-3.
3	39.7608° N	-78.8958° W	1981, 1991, 1995	Upstream of Route 160, off of Porter Road.
4	39.7531° N	-78.9019° W	1981, 1991	Downstream of Shirley Hollow Road bridge, below WPC site EF-3.
5	39.7339° N	-78.9095° W	1981	Below first crossing of triangle-shaped trail off of Old Mount Savage Road, just below WPC site MI-7.

WPC Electrofishing Sites

Site #	Site name	Latitude	Longitude	Location
1	EF-1	39.80908° N	-78.85935° W	Mouth of Laurel Run.
2	EF-2	39.77982° N	-78.8749° W	Off of Gomer Hollow Road.
3	EF-3	39.75164° N	-78.90253° W	Downstream of Shirley Hollow Road bridge.
4	EF-4	39.72085° N	-78.92307° W	Downstream of driveway off of Sampson Rock Road south of Pa. border in Garrett County, Md. (no fish found here).

Table 10.

Comparison of fish species found by PFBC at Laurel Run sample sites in 1981, 1991, and 1995 with species found by WPC in 2006. Note: PFBC sites 4 and 5 were not sampled in all three years, and WPC did not have a 5th sample site, so these areas are shaded gray.

	PFBC data			WPC data	
Species	***1981***	***1991***	***1995***	***2006***	**Site #**
Blacknose Dace	X	X	X	X	1
	X	X	X	X	2
	X	X	X	X	3
	X	X			4
					5
Longnose Dace	X	X	X	X	1
	X	X	X	X	2
	X	X			3
		X			4
					5
Redside Dace	X				1
					2
					3
					4
					5
Rosyside Dace		X	X		1
			X		2
					3
					4
					5
Bluegill					1
	X	X			2
	X	X	X		3
	X				4
	X				5
Brook Trout	X	X	X	X	1
	X	X	X	X	2
	X	X	X	X	3
	X	X			4
	X				5
Brown Trout	X	X			1
		X			2
					3
					4
					5
Rainbow Trout	X				1
					2
					3
					4
					5
Brown Bullhead					1
					2
					3
	X				4
					5

Table 10.

Continued

	PFBC data			WPC data	
Species	***1981***	***1991***	***1995***	***2006***	**Site #**
Central Stoneroller	X			X	1
					2
					3
					4
					5
Creek Chub	X		X	X	1
	X	X	X		2
		X			3
					4
					5
Black Redhorse Sucker					1
				X	2
					3
					4
					5
Golden Redhorse Sucker					1
				X	2
					3
					4
					5
White Sucker	X	X	X		1
	X	X	X		2
	X	X			3
		X			4
					5
Mottled Sculpin	X			X	1
	X			X	2
	X			X	3
	X				4
					5
Slimy Sculpin		X		X	1
		X		X	2
		X		X	3
		X			4
					5
Sculpin spp.			X	X	1
			X		2
			X		3
					4
					5
Pumpkin-seed					1
	X				2
					3
	X				4
	X				5
White Crappie			X		1

Appendix D

PADEP Stream Designations

High Quality and Exceptional Value Designations

The HQ and EV designations require that development activities do not degrade existing water quality. This does not mean that all development will stop, but rather requires that projects, such as building a new residential development or road, undergo a more rigorous permit review by PADEP, including a tiered antidegradation review for any proposed new discharges. For HQ waters only, if a discharge that lowers water quality is still proposed after an evaluation of nondischarge alternatives, the antidegradation best available combination of technologies (ABACT) to protect water quality, and nondegrading discharge methods, it will only be permitted if the applicant can demonstrate that the discharge is necessary to accommodate an important economic or social development in the area. This "SEJ exception" applies only to HQ waters; water quality must be maintained and protected without exception in EV waters (Royer et al. 2007).

For a stream to be eligible for HQ status, it must meet one of three qualifiers, either for water chemistry based on 12 parameters, biological assessment using benthic macroinvertebrates, or being a Class A Wild Trout Stream. Because the entire length of Laurel Run is already designated as at least HQ based on its Class A Wild Trout Stream status, it was not necessary or practical to evaluate the stream's water quality based on all 12 chemical parameters, or determine whether it meets the 83 percent integrated benthic macroinvertebrate score necessary for the HQ biological assessment qualifier. However, if there was ever a desire to upgrade the lower section of Laurel Run from HQ to EV in order to give the entire stream the EV designation, an in-depth evaluation of the benthic macroinvertebrate community would be worthwhile. This would determine if the stream meets the 92 percent integrated benthic macroinvertebrate score required to meet the biological assessment qualifier for EV designation. WPC's macroinvertebrate data would be adequate to submit to the PADEP should a petition for EV designation be attempted at some point in the future, because PADEP would then conduct its own stream assessment and data analysis. This biological assessment is only one of the seven ways in which a stream can qualify for the EV redesignation (see below). Petitioning for EV redesignation is a lengthy, complex process; detailed information can be found in Penn Future's Stream Redesignation Handbook (2006).

Criteria for upgrade to EV

Already designated as HQ, plus one of the following attributes:

1. Location in a National Wildlife Refuge or state game propagation and protection area.
2. Location in a State Park Natural Area, State Forest Natural Area, National Natural Landmark, Federal or State Wild River, Federal Wilderness Area or national Recreational Area.
3. Outstanding national, state, regional or local resource water.
4. Surface water of exceptional recreational significance.
5. Biological assessment qualifier.
6. "Wilderness Trout Stream" qualifier; or:
7. Surface water of exceptional ecological significance (HQ designation not required).

Seeking to upgrade the lower section of Laurel Run to EV status was not WPC's goal in this project. However, should a local group ever decide to petition for an upgrade, WPC would consider supporting such an effort. This information is being included to aid any such groups in the future.

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Notes

Notes